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The Non-protein Nitrogen and Uric Acid in Blood in Vomiting of Pregnancy.

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IN view of the interest which has always been taken in the vomiting of early pregnancy it is surprising to find how little attention has been paid to the examination of the non-protein nitrogen fractions of blood in this condition. We have only been able to find a record of four cases.

Observer.	N.P.N.	Uric acid.	Urea N.	NaCL.	Creatinine.	Clinical note.
	Mgs. per 100 cc. blood.					
Farr and Williams (1914) ...	22	—	8	—	—	Uncontrollable vomiting and ptyalism
Slemons and Bogert (1917) ...	—	3.8	—	—	—	Neurotic vomiting
„ „ ...	56	—	8	410	1.6	Pernicious vomiting
Killian and Sherwin (1921) ...	34	3.0	12	470	1.9	Pernicious vomiting

The figures as such reveal very little, nor are they connected with the clinical condition of the patient. Probably the fact that such observations as were on record did not show any very marked variation from the normal, and the rather widespread belief that neurosis or hysteria was the fundamental cause of the condition, have contributed to this paucity of data. Nevertheless we believe it is possible to show from our series that definite disturbances exist.

We have determined the non-protein nitrogen, urea, uric acid, and chlorides* in a series of cases of nausea and vomiting of pregnancy.

The cases comprised all types from the mildest to the most severe, and we have grouped them according to their degree of clinical severity. Most of them have been under the personal charge or observation of one of us, and have been accorded the routine treatment devised by Harding and his associates (Duncan and Harding, 1918), (Harding, 1921), (Harding and Watson, 1922). This consisted of rest in bed with isolation, and administration of glucose by rectum or by the interstitial or intravenous route, depending upon the severity of the case, and the urging of fluids. The detailed management of such cases is to be found in previous papers. In some of the cases, however, there was not this opportunity to exercise such a control.

The first blood specimen was generally taken on the patient's admission to the ward, before any treatment was instituted, though owing sometimes to circumstances of admission to the hospital this was not always possible. The second or succeeding specimens were taken at points of time related to the clinical condition. Twenty-four hour urine collections were made daily, and routine analysis carried out on them, particular attention being paid to the volume, specific gravity, and "acetone." The value of such collections in the control of the treatment has been emphasized previously. We have usually taken as a satisfactory indication of a sufficiency of water being supplied to such patients, that the urine volume which is low on admission shall increase to at least one litre, and the specific gravity shall fall from a higher figure to 1010 or under. Moreover for the treatment to be successful such a change should take place within five or six days. At the same time, or a little earlier, the patient shows clear signs of clinical improvement; the "acetone" bodies diminish in amount and disappear simultaneously a day or two later. This combination of findings is so constant that we have come to look for it with confidence. Occasionally one of the three findings is varied, but this is rare under a properly directed treatment. In order to save space and avoid the repetition of a number of urine charts which would be very similar to those already published in other papers, we have indicated by the word "diuresis" and the date that such urine changes were duly noted. The coincident clinical condition is also indicated.

The cases in Group I are classed as mild cases from their clinical appearance on admission. Such a classification too is justified by the rapidity and ease with which they improved. Four of the cases

* Analytical Methods: Non-protein Nitrogen (Folin and Wu, 1919). Uric Acid (Benedict, 1922). Chlorides (Whitehorn, 1920-21).

GROUP I. MILD.

Case.	Para	Months preg.	Date.	N.P.N. Mgs.	Uric acid. per 100 cc.	Urea N. Blood.	NaCL.	Clinical Notes.
Fy.	1	2	4/12/22	22	3.51	9	454	Nauseated 3 weeks; threatened abortion; improved on carbohydrate diet in 2 days. "Diuresis" 6/12/22.
Bl.	0	2	21/12/22	27	3.20	15	500	Vomiting 7 days; seemed very well; refused treatment. Discharged.
Le.	2	2½	4/4/23	25	2.34	16	498	Nauseated 1 month; able to take meals; some signs of dehydration. Improved in 2 days on carbohydrate-protein diet and 1000 cc. interstitial glucose. "Diuresis."
By.	0	2½	10/4/23	24	2.48	14	475	Acute vomiting 3 days; sent in for tumour. Recovered 48 hours on diagnosis of pregnancy. Slight signs of dehydration. Intravenous glucose. "Diuresis" 12/4/23.
			14/4/23	25	2.81	—	512	
Gg.	2	3	28/5/23	28	2.52	—	485	Reported vomiting 2 months. No acetone in urine, but developed after 24 hours starvation. Urine specific gravity always low; pregnant vomiting doubtful.
			4/6/23	23	2.88	—	505	
Pk.	0	3	26/10/22	27	2.0	6	369	Vomiting 2 months; weak and emaciated, but no signs of dehydration; recovery 2 days. "Diuresis" 30/10/22.

showed urines of high specific gravity on admission and a "diuresis" on treatment. Two of them showed undoubted clinical signs of dehydration though not marked, and it may be noted that we have slightly changed our routine procedure in this connexion by extending the use of intravenous or interstitial glucose to all those cases showing any such signs, and administering the treatment at once, irrespective of whether from other signs the patient would be judged as being in a severe condition.

The chemical examination of the blood reveals an entirely normal picture except that cases Fy and Pk show a rather low urea nitrogen as compared with the others. Only in case Pk, however, can the amount of urea be considered as definitely subnormal. The chlorides too in this case are very low. Cases By and Gg act also as controls on the effect of the treatment. The non-protein nitrogen, uric acid and chloride content of the blood show no significant variation as a result.

In Group II we have a series of cases in which the clinical condition was undoubtedly more serious than in the previous group. Dehydration was undoubtedly present in all except one, and the treatment resulted in marked clinical improvement with ultimate recovery. Coincident, or nearly so, with the clinical improvement was the "diuresis." In all cases but one (and this case we only saw after treatment had been instituted for some few days—Case Ct) the level of the non-protein nitrogen is higher than in the previous group. While the figures for non-protein nitrogen (with two exceptions) would not ordinarily be regarded as outside the range of normal variation we believe them to be so. In a paper shortly to be published we shall show that it is rare to find a N.P.N. of higher value than 30 mgs. in the early months of pregnancy.

There is thus an increase in non-protein nitrogen.

There can be no doubt, however, that the figures for uric acid represent an increase in the usual value ascribed to that substance. Case Jm might be considered an exception, as 3.5 mgs. uric acid per 100 cc. blood has been given by Benedict (1922) as the normal maximum figure, using the same analytical method as ourselves. Again, however, we find, and the results will be published shortly, that a value of 3.0 mgs. uric acid per 100 cc. blood is a maximum value found in the early months of a strictly normal prognancy. The greatest interest, however, attaches itself to the results obtained from the second or succeeding specimen of blood, which was taken on the patient's recovery, and from two to five days after "diuresis." In all cases evidence of retention of non-protein nitrogen or uric acid has disappeared. The figures have all come within the range of normal variation except the uric acid of Case Mx. It would appear that in the moderate and severe cases these

GROUP II. MODERATE AND SEVERE.

Case.	Para.	Months preg.	Date.	N.P.N. Mgs.	Uric acid. per 100 cc. Blood.	Urea N.	NaCL.	Clinical Notes.
Be.	4	3½	8/10/22	32	6.6	9	—	Continuous vomiting nearly 3 weeks; slight dehydration; general condition poor. "Diuresis" 10/10/22. Recovery.
			15/10/22	24	2.58	8	—	
Mn.	2	3	17/12/22	34	8.89	18	386	Persistent vomiting 3 weeks; slight dehydration. Intravenous glucose. "Diuresis" 21/12/22. Recovery.
			23/12/22	—	2.20	—	490	
Mt.	2	2½	10/1/23	35	4.4	—	435	Moderately severe; dehydration. Not seen until treatment instituted and improvement commenced and "acetone" disappeared. "Diuresis" 12/1/23. Recovery.
			14/1/23	23	2.4	8	498	
Ct.	0	3	28/3/23	25	4.48	—	487	Severe marked jaundice; dehydration. Not seen until after series of interstitial glucose. "Diuresis" 1/4/23. Recovery.
			4/4/23	22	2.34	—	554	
Jm.	1	2	18/5/23	38	3.34	—	527	Nauseated 3 weeks. Acute vomiting 3 days. Dehydrated. Intravenous glucose. "Diuresis" 25/5/23. Slow Recovery.
			30/5/23	28	1.95	—	468	
My.	0	2½	14/7/23	30	5.4	—	462	Moderate nausea 1 month, gradually increasing. Slight dehydration; intravenous glucose. "Diuresis" 18/7/23. Recovery. "Acetone" persistent to 26/7/23.
			27/7/23	25	2.8	—	495	
Do.	3	1½	4/8/23	32	8.2	—	462	Vomiting 4 days. No dehydration evident. Interstitial and intravenous glucose. "Diuresis" 8/8/23. Recovery.
			12/8/23	27	2.8	—	495	
Do.	3	3	22/8/23	38	9.4	—	445	Relapsed through inattention to diet. Intravenous and interstitial glucose. "Diuresis" 29/8/23. Slow recovery.
Mx.	2	2	24/9/23	88	5.35	37	482	Did not seem acutely ill, or markedly dehydrated. Creatinine 1.54 mgs. per 100 cc. blood. Given three intravenous glucose. Marked improvement after each. "Diuresis" 29/9/23. Recovery 1/10/23.
			26/9/23	45	5.25	9	501	
			2/10/23	31	3.8	8	472	

retentions are consequent upon the dehydration of the patient, for they disappear when this is overcome, as evidenced by an increase in the volume of the urine, and a decrease in its specific gravity. Case Mx is especially interesting as there was here a very marked retention of N.P.N. urea and uric acid. We were also able to follow the effect upon the blood picture of a series of intravenous glucose administrations more closely than in other cases, and it is interesting to note that the return to normal, coincident with clinical improvement, takes the opposite direction to that pointed out by Chace and Myers (1916) as occurring in the retention of nephritis. Thus the urea is the first to fall to normal, followed by the uric acid.

Vomiting continuing throughout pregnancy is not common in uncomplicated cases, though it may often be a symptom of the disturbances of later pregnancy. It is probable that the two cases under Group III belong to such a group of disturbances rather than to those of early pregnancy, nevertheless both cases show a common finding with the cases of Group II. An increase in N.P.N. and uric acid on admission is followed by a decrease after "diuresis" coincident either with clinical recovery or marked clinical improvement. It will be noticed that although there is a decrease, the figures for uric acid do not fall to normal value, even in the case Sn after labour.

The group of cases in which it was deemed advisable to carry out a therapeutic abortion does not present that gradation in the chemical characteristics of the blood that might have been expected. The non-protein nitrogen only shows a definite increase in one case. The uric acid is increased but not excessively so. There was no indication to be gained from such a chemical examination of the blood that therapeutic abortion was demanded; yet cases Vn and Prs were judged to be so severe that therapeutic abortion, without waiting to determine the effects of any treatment, was advised by all the consultant obstetricians. It is extremely instructive to note that these two cases, which made a prompt recovery after abortion, showed a marked drop in the specific gravity of the urine, with some "diuresis" and a return to normal of the uric acid. Cases Vr and Mk never at any time seemed acutely ill, and were treated thoroughly with all proper care. The immediate effect of an intravenous glucose was temporary improvement, with a temporary decrease in the specific gravity of the urine. A true "diuresis," however, was never obtained. Therapeutic abortion here was not followed by prompt recovery. Some improvement was witnessed in Vr but she then rapidly sank and died. Mk developed some disorientation and double optic neuritis. Her first pregnancy had been similarly marked.

GROUP III.

VOMITING IN LATE PREGNANCY.

Case.	Para.	Months preg.	Date.	N.P.N. Mgs.	Uric acid. per 100 cc.	Urea N. Blood.	NaCL.	Clinical Notes.
Bd.	4	7–8	9/12/22	40	4.2	—	429	Had been under treatment for syphilis. B.P. 115/74.
			13/12/22	61	8.79	23	330	No œdema; nausea and vomiting continuous throughout pregnancy. Dehydration marked.
			18/12/22	27	4.0	10	469	No improvement till 13/12/22 after intravenous. "Diuresis" 17/12/22. Recovery.
Sn.	0	8½	10/1/23	36	9.6	17	402	Vomiting early months; cessation 5th month; recommenced 6th month, and then several times a day. Poor condition; B.P. 110/80.
			15/1/23	29	9.7	18	528	No œdema. Epigastric pain.
			17/1/23	28	5.1	17	445	Slight jaundice. Marked dehydration. "Diuresis" 16/1/23.
			20/1/23	28	4.8	12	478	Very considerably improved, but not completely well. Labour induced
			25/1/23	28	5.5	16	396	23/1/23.

GROUP IV.

CASES FOLLOWED BY THERAPEUTIC ABORTION.

Case.	Para.	Months preg.	Date.	N.P.N. Mgs. per 100 cc.	Uric acid. Mgs. per 100 cc.	Urea N. Blood.	Clinical Notes.
Vn.	0	2½	27/9/22	29	4.56	16	Marked jaundice and dehydration. Pulse rapid; condition very poor. No treatment. Immediate abortion 27/9/22. Intravenous. Prompt recovery after operation. "Diuresis" 29/9/22.
			29/9/22	—	3.29	11	
Prs.	2	4	14/2/23	50	5.2	—	Marked jaundice and dehydration. Therapeutic abortion 14/2/23. Intravenous saline; recovery. "Diuresis" 20/2/23.
			22/2/23	27	2.5	—	
Vr.	0	2½	29/9/22	21	4.58	4	Mitral stenosis. Had been treated on a previous admission with improvement. but relapsed at home. Some dehydration. but never seemed acutely ill. No improvement in 7 days treatment. No "diuresis." Abortion 7/10/22, followed by slight improvement, but then rapdly sank. Died 13/10/22. Autopsy; acute nephrosis; fatty degenerated liver.
			3/10/22	25	2.84	3	
			12/12/22	—	2.25	—	
Mk.	1	4	4/10/22	24	2.81	6	Never seemed acutely ill. Dehydrated. No improvement in 12 days treatment except temporary after intravenous. Abortion 15/10/22. Slow recovery; developed optic neuritis.
			14/0/22	24	3.2	9	

Discussion.

The value of the determination of the non-protein nitrogen and uric acid in blood in many pathological conditions is to determine the excretory function of the kidney, and it was with this idea in mind that we first commenced this investigation. From the work of Myers, Fine and Lough (1916), and Baumann, Hansmann, Davis and Stevens (1919), it would appear that the determination of uric acid in blood gives one of the earliest and most delicate indications of even mild nephropathy. In the preceding part of this paper we have made it clear that there is a direct connexion between the increases which we find in the non-protein nitrogen and uric acid and the " diuresis " which we invariably observe when the treatment is successful. When the oliguria is overcome by the use of fluids then the uric acid and non-protein nitrogen either return to their normal values or are very much lowered.

It would appear too that there is a correspondence between the clinical condition and the retention of the nitrogenous waste products in the blood. Thus the mild cases show no retention, whereas the moderate and severe cases always give increased values for these constituents. This is borne out by other cases, not in this series, where we have had an opportunity to make only an analysis of the blood, and not to follow the treatment. As may be gathered, however, from the previous section of this paper, the result of such an analysis taken alone has no clear-cut prognostic value. The determination of the nitrogenous waste products in the blood only occasionally offers more assistance to the physician in charge of a case of nausea and vomiting of pregnancy, than can be gained from the collection of the twenty-four hour specimens of urine, with the observation of its volume and specific gravity from day to day during treatment. From our experience, however, we should judge that a patient showing a N.P.N. of 50 mgs. or over would be a serious case.

The coincidence of the lowering of the figures for the nitrogenous waste products of the blood, the appearance of the " diuresis " and the improvement in the clinical condition, lead one to seek a common cause. Such a cause would be found in the dehydration which is usually present in such patients. Thirst, dry furred tongue, cracked lips, and dry skin, one or all of these may be present. Dehydration, or anhydræmia (Marriott, 1923), in other conditions is known to increase the non-protein nitrogen constituents of the blood. Such a result is obtained partly by the desiccation of the blood itself and a concentration of its constituents, but more by the impairment of renal function consequent upon the lack of available water. The impairment in these cases is usually

purely temporary, and disappears when the anhydræmia is overcome by the use of water.

That some degree of anhydræmia is undoubtedly present is clear from the fact that in many of our cases we find the blood viscous and difficult to draw. Moreover in case Ct (Group II) a determination of the red and white cells on admission showed 7,040,000 and 18,000 respectively; after "diuresis" the figures were 5,440,000 and 7,000. We should wish to emphasize, however, that the clinical signs of dehydration and the chemical evidence do not always correspond. Thus undoubted, though slight, signs of dehydration were present in some of the mild cases where the blood showed no evidence of concentration. On the other hand, some of the cases showing marked retention of nitrogenous waste-products did not seem acutely ill, and the dehydration could not be regarded clinically as extreme or even severe. Anhydræmia, or the degree of the desiccation of the blood with its resultant effects on kidney function, then would offer an explanation of our results. The amount of water lost by the blood in mild cases would be small, and would consequently produce very little change in the amount of the nitrogenous waste products either by direct concentration or by impairment of the renal functions. Such changes would be more marked in the severer cases, corresponding to a greater degree of anhydræmia.

Anhydræmia consequent upon the vomiting would also be present in the vomiting of later pregnancy, though, as we have stated, such a condition might possess an etiology different from that of the vomiting of early pregnancy, or might be a continuation of the same. The presence of albumin in the urine of these patients, sometimes with casts, is also in agreement with such an explanation. Such a urinary finding is common in infants suffering from gastro-intestinal disturbances, accompanied by diarrhœa, where the desiccation of the blood is much more rapid and more marked than in cases of vomiting of pregnancy (Marriott, 1920).

It may also be possible that anhydræmia explains some of the failures which from time to time have been encountered in the use of this treatment. Such cases as are meant do not seem acutely ill; there are usually some signs of dehydration, but clinically there would be no reason to suspect a grave prognosis. Case Mk (Group IV) is an example of such. There is a favourable response to the use of intravenous or interstitial injections of glucose but the good effect is purely temporary. Certainly the "diuresis" which is indicated in this treatment as a sign of a successful issue is lacking. Finally after a certain amount of temporizing therapeutic abortion is decided upon. Sometimes it is immediately successful, but more often convalescence is prolonged, if not actually stormy.

What represents the difference between this case and the ordinary case in which recovery takes place in five or six days? It may be possible that the contrast is determined by the stage of the anhydræmia. Anhydræmia brought about suddenly, as in acute cases of vomiting, results in an increased concentration of the blood constituents, and this condition can be restored to normal by the addition of water (Underhill and Kapsinow, 1922), (Keith, 1922), (Utheim, 1920). On the other hand, anhydræmia brought about more slowly, or when cases in which the more acute type is allowed to remain uncorrected by the giving of fluids, is not characterized by such an increase in solids (Utheim, 1920—1922). Destruction of the cellular elements and serum proteins occurs, so that the blood may show a normal concentration of these, though we have not noticed in the literature the effect of this slow change on the non-protein nitrogen and uric acid content of the blood. In this type of anhydræmia, however, the giving of water or saline solution or glucose will not result in a restoration of the blood in its normal condition. The corpuscular elements and the protein will be low in amount, and recovery can only take place when these constituents reach their normal value. It may be possible, and we think this worthy of investigation, that the type of case represented by Mk may be in such a condition of anhydræmia. In this manner we have been led to place great stress upon dehydration resultant upon the vomiting. Whatever may be ultimately discovered about the etiology of this condition, there can be little doubt in our minds that if the condition is allowed to progress, lack of water will dominate the clinical picture.

The amount of urea N in the blood and its ratio to N.P.N. has also received some attention. It many cases it will be found to be low, and although the lowest amount is to be found in the fatal case, yet we do not interpret our figures as evidence of hepatic disturbance (Killian and Sherwin, 1921). Low ratios are also to be found in the mild cases, and it is much more likely that they are due to a low level of nitrogenous metabolism during the consequent starvation, rather than expressive of a disturbed hepatic function.

The chlorides also show the influence of starvation, and probably of the oliguria. In whole blood the amount normally present is given as 450—500 mgs. of NaCl per 100 cc. Thus in Group I they range from 454 to 500 on admission except case Pk which shows a low value of 369. It is interesting to note that this case also shows a very low urea ratio. With the exception of case Jm (Group II) the two succeeding groups show a lowered chloride value on admission, usually below the threshold value, and rising to normal on "diuresis."

SUMMARY.

1. Mild cases of vomiting of pregnancy show normal N.P.N. and uric acid values.

2. More severe cases show increased values for N.P.N. and uric acid.

3. The increased values observed in the severer cases return to normal by administration of fluids in amount sufficient to produce a "diuresis."

4. Improvement in clinical condition accompanies "diuresis."

5. Cases judged of such severity as to require therapeutic abortion did not show extreme raised values for N.P.N. and uric acid. Two cases, in which prescribed treatment had failed to produce "diuresis" and clinical improvement, did not show prompt recovery after abortion.

6. Low Urea/N.P.N. ratios can be observed in all classes of cases.

7. The chloride content of blood in vomiting of pregnancy is normal or lowered. It usually increases on recovery.

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On the Influence of Pregnancy on the Wassermann Reaction and on the Clinical Manifestations of Syphilis.*

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It is well known to workers upon the pathology of Still-birth that, unlike the obstetric history, the history of syphilitic infection of the mother frequently proves of singularly little value as an aid to diagnosis of syphilis in the fœtus. If such a history is present it is of course of the greatest importance, but its absence must by no means be relied upon as evidence of the absence of syphilis, for it is not uncommon to find that mothers of syphilitic infants themselves show no clinical signs, and give absolutely no history of syphilitic infection. At an early period of my work I thought that this was a discovery of my own, but on looking into the literature on the subject I found that the fact was well known and had been noted by almost every writer on syphilis in its relation to obstetrics. Unfortunately, its importance is not yet appreciated by obstetricians who are often content confidently to exclude syphilis when a history of infection is absent. As we shall see afterwards the Wassermann reaction in these cases is also frequently negative at least during pregnancy. This combination of a negative Wassermann reaction with a negative history must not be allowed to mislead, and expert examination of the product of conception, especially if dead, will prove of the greatest assistance in the future management of the case. Even in the absence of this, the therapeutic test, viz., treatment of both parents by the arsenical preparations, may result in the birth of a healthy child after other remedies have failed (for example, potassium chlorate) and thus reveal the true nature of the disease.

Abraham Colles, writing in 1837, says: "There are cases in which the fœtus *in utero* has been infected under circumstances so strange and so difficult to explain that nothing short of actual observation could induce us to allow the fact. The circumstances to which I allude are these: The father of the child has had primary symptoms six or eight months before his marriage; for these he has been treated by mercury; has undergone a full course of this medicine under which his symptoms have been removed. . . . . .

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In six or eight months after this treatment he marries. In the ordinary time his wife becomes pregnant and carries the child until the 7th or 8th month when abortion takes place, and that without being preceded by any of these circumstances which in ordinary contribute to its occurrence. The same fatality attends on the second, third and perhaps fourth pregnancy. . . . . At length suspicion arises in the mind of the accoucheur; he examines the product of the next abortion, and finds that the cuticle is loose and that it readily peels off in patches of greater or less extent. . . . . Until these repeated abortions shall have attracted the attention of the accoucheur there has not been any one circumstance which could have raised suspicion as to the true cause of them; for both parents continue all this time to live in the enjoyment of perfect health, no trace of disease is to be discovered in either. When the husband is questioned he candidly avows that he had before marriage been affected with primary symptoms; that he had been, as he thought, cured of them; and that having allowed six or eight months to pass over before his marriage, without perceiving any sign of a return of the disease he had concluded that it had been perfectly eradicated from his system. *On further enquiry it is ascertained that his wife had never complained of any sensations which might lead even to a suspicion of her having had primary symptoms; nor has any appearance taken place in her which can even bear a resemblance to secondary symptoms.*"[1]

Jonathan Hutchinson,[3] in commenting upon the law of Colles, writes: "Is it not the fact that women bear syphilitic children without having ever themselves, either before or during pregnancy, had any symptoms, either primary or secondary of that disease? If this happened only once or twice we might reasonably doubt the histories given us. But it is not so; it is in hundreds of cases." He believed, however, that the mother gained immunity without herself suffering from the disease in its developed form.

McDonagh[2] believes that if a woman contracts syphilis after she has conceived, the Wassermann reaction will be positive because the disease becomes generalized and behaves in the ordinary way, but that in all cases of conceptional syphilis (*i.e.*, syphilis acquired at the time of conception) symptoms are absent and the Wassermann reaction negative until after the child-bearing period is over. He holds that the sporozoites which he believes to be the first stage in the life history of the leucocytozoon syphilidis and only potentially harmful, while they may develop into gametes in the embryo and kill it, are prevented from developing in the mother's blood by means of a chemical substance derived from the chorionic cells and there remain dormant for a time. McDonagh concludes that the serum of women contains more natural protective substances than

that of men and that these protective substances are increased during pregnancy. He believes that after the menopause these protective substances are to a large extent lost, and that this accounts for the alleged frequency with which tertiary symptoms, especially gummata, together with a positive Wassermann reaction, may occur in women at this period.

Hendry [4] has had a similar experience in so far as the clinical history is concerned. "A history of primary or secondary syphilis," he says, " is difficult and rarely possible to obtain; its absence is of no value."

Nor is this absence of syphilitic history due to the fact that the mother is healthy, for there is no doubt that the mother of a syphilitic child is always herself syphilitic. The " law of Colles " was based upon the assumption that the mother of a syphilitic child might be healthy though the wording of the " law " might lead one to suppose that Colles was doubtful whether she might not really be suffering from syphilis. It is as follows: " A child born of a mother who is without any obvious venereal symptoms, and which, without being exposed to any infection subsequent to its birth, shows this disease when a few weeks old; this child will infect the most healthy nurse, whether she suckle it or merely handle and dress it; and yet this child is never known to infect its own mother, even though she suckle it while it has venereal ulcers of the lips and tongue." Since the introduction of the Wassermann test, however, it has been demonstrated that such women are in reality syphilitic.

With regard to my own experience in this matter, I have found that in 75 per cent. of cases in which a definitely syphilitic fœtus was born there was no history of infection in the mother and no signs of the presence of syphilis (not including amongst signs for the moment the Wassermann reaction). All were cases of probable old standing infection, and it is possible that in them evidence of secondary syphilis had been present really at one time but had been forgotten by the patient. It is somewhat significant that a history of infection and clinical evidence of it are generally found in primigravidæ, who give birth to a syphilitic infant, while in multiparæ such a history is usually absent.

With a view to obtaining some fresh light upon the significance of the frequent absence of a history or of signs of syphilis I studied the histories of all the syphilitic patients who had passed through the indoor department of the Venereal Diseases Clinic at the Edinburgh Royal Maternity Hospital since its opening three years ago. The patients numbered exactly 100, and the results obtained are summarized in the following table:—

Parity.	No. of cases.	No. showing history or signs of infection.	No. showing no such history.	Percentage showing history or signs.	Percentage showing no history or signs.	Remarks on cases showing signs or giving history of syphilis.
1	31	22	9	70	30	All 22 suffered from primary or secondary syphilis at time of examination.
2	29	13	16	44	56	In nine secondaries were present at time of examination. One primary sore at time of examination. In six of these cases the first child was alive and well; in the others no record; in one was history of secondaries 12 years before, in one specific keratitis and W.R. + + + (no other history), and in one tertiary ulcer of the leg with no other signs or history. W.R. + + +.
3	11	3	8	29	73	Two of the three showed tertiary ulceration without other signs or history except W.R. + + +; the third had sores on vulva with W.R + + +, and was probably a case of recent infection.
4	9	6	3	75	25	All six were cases of recent infection with evidence of primary or secondary syphilis.
5	6	1	5	16	84	During the fourth pregnancy this patient had come under observation at the eighth month, and then had vulval sores from which Sp. P. were obtained.
6	4	2	2	50	50	One showed signs of secondary syphilis, and another osteomyelitis fibrosa cystica with three spontaneous fractures of femur. W.R. + + +. No other history of infection.
7	4	3	1	75	25	All three cases of recent infection with secondaries.
10	2	—	2	—	100	
11	2	—	2	—	100	
12	2	—	2	—	100	

A study of this table shows:—

(1) That in a general way evidence of infection is present more frequently in primigravidæ; that except for cases of recent infection the presence of a history or of signs of syphilis is less likely to be found the farther we ascend in the scale of multiparity.

(2) In only one of the multiparæ with old infection was a history of syphilis given on questioning; in all the others in whom clinical evidence of it was found the diagnosis was made not from the history, which was negative, but from the presence of definite signs of tertiary syphilis combined with a strongly positive Wassermann reaction.

(3) Out of 100 cases there were 31 primigravidæ, and 60 multiparæ. Twenty-two of the latter were cases of recent infection, which, in all but two, had occurred since the birth of the last child, and therefore in this connexion these should really be classified as primigravidæ. Of the remaining 47 cases, 41 gave no history and showed no evidence of infection, while of the remaining six, one admitted secondaries 12 years before, one had specific keratitis with a strongly positive Wasserman reaction, one had tertiary leg ulcer, W.R. ditto, one had ulceration of the palate, and one of the nose and upper lip, and one suffered from osteomyelitis fibrosa cystica, with three successive spontaneous fractures of the femur and a strongly positive Wassermann reaction; but none of these five gave a history of secondaries. Of the 31 primigravidæ 70 per cent. showed well-marked evidence of syphilis. *In none of these cases was it necessary to depend upon a history; probably if it had been necessary none would have been obtained.* In only one multipara out of 47, excluding those 22 who showed secondary or primary signs at time of examination, was a history of syphilitic infection given (that is, slightly over 2 per cent.); 46 failed to give any history of infection, although all revealed it by their products of conception, Wassermann reactions, or evidence of tertiary syphilis, or by all combined. Are we, therefore, to suppose that only one of these 47 multiparæ had ever any signs of secondary syphilis while such was demonstrated to be present in at least 70 per cent. of primigravidæ? Every multipara has been a primigravida at some time, and according to the above findings 70 per cent. of primigravidæ show well-marked evidence of primary or secondary syphilis. It is reasonable to suppose that at least 70 per cent. of the 47 multiparæ also at one time showed similar evidences of syphilis, but that this had been forgotten or purposely concealed.

(4) Thirty per cent. of primigravidæ (nine cases in all) have no history (none recorded) and showed no signs of syphilis. Details of these cases are as follows:—

No. 80, æt. 21. Husband under treatment for syphilis during present pregnancy; mother gave no history and showed no signs (closely questioned by myself). W.R. negative, but doubtfully positive after provocative Nov Arseno Billon. Has received five intravenous injections N.A.B. (1.5 grms.) during pregnancy. Infant premature, lived two days, spirochæte negative, massive hæmorrhages in lateral ventricles, and in lungs; histological and naked eye examination inconclusive as regards syphilis; cord blood negative; mother's blood negative on three occasions, viz., one day, 10 days, and nine weeks after delivery. She came again under observation in second pregnancy, having received no treatment in the interval. Her W.R. was weakly positive three days before delivery. She gave birth to a healthy full-time infant. Cord blood negative. Infant's blood also negative at 10 days old. Mother's blood negative 10 days after delivery.

It is therefore doubtful whether this woman ever has had syphilis, the only sign of it being a weakly positive W.R. shortly before delivery in both pregnancies, as well as the premature infant. It should, however, be noted that after her last injection jaundice set in with epigastric pain and sickness, after which, and possibly as a result of which, she went into labour.

No. 215, æt. 19. Admitted in labour. No previous supervision. Macerated fœtus (not examined). Mother's W.R. + + + three days after delivery. No history of venereal disease recorded.

No. 232, æt. 25. Came to antenatal clinic at two weeks before term; no history of infection obtained; no signs of syphilis. Suffering from yellow discharge. Admitted to wards on account of this. W.R. + + + 10 days before delivery. Cord blood negative. Child born apparently healthy.

Note this patient's age. There was possibly old infection in this case; on the other hand, it is possible the positive W.R. was an error, for note the negative cord blood.

No. 359, æt. 31, single, had been attending a treatment centre and treated for gonorrhœa for six months before W.R. taken, then found strongly positive one year before pregnancy. W.R. strongly positive again three months later in spite of treatment. The following month contracted acute gonorrhœa, and probably about that time became pregnant. W.R. strongly positive at fourth month, and also, four days before delivery, cord blood strongly positive. Child full-time and apparently healthy. Treatment with sulpharsenal and intermittent only, on account of albuminuria.

In this case there was no doubt about the presence of syphilis.

In deciding, however, regarding possible absence of history the age should be taken into consideration, the habits of the patient making it probable that the infection had been contracted many years prior to her coming under observation. There is therefore a strong case for there having been clinical evidences of syphilis present at some time.

No. 388, æt. 27. Admitted three weeks before term on account of albuminuria. W.R. strongly positive. One injection N.A.B. given before delivery. Cord blood weakly positive. Infant's blood negative at 10 days old. Child apparently healthy; weight at birth 4,120 grms.; placenta 720.

The presence of syphilis in this case is doubtful, and if present is probably of old standing; note age.

No. 655, æt. 19. Admitted in labour; no previous supervision. Macerated fœtus; organs spirochæte positive. *Cord blood negative.* Mother's W.R. + + + three days after delivery. *Questioned by myself* absolutely no history of infection could be obtained.

No. 675, æt. 30. Admitted in labour; no history of syphilis noted. Mother apparently healthy, but W.R. + + +. Child post-mature, healthy, 4,340 grms. Placenta 973 grms. The presence of syphilis in this case is doubtful; no evidence except W.R. If present is probably of old standing; note age, the patient may have forgotten she had symptoms.

No. 765, æt. 18. Admitted three days before delivery; no note of history of infection or of cord blood. Mother's W.R. + + + three days before delivery. Child three weeks premature; healthy. No further history.

No. 816, æt. 24. Admitted in labour; macerated fœtus born. W.R. + + + one week after delivery. No history of infection noted.

In four of these cases, namely, 80, 232, 388 and 675, the presence of syphilis seems doubtful. In one, 359, the disease was probably of old standing, and signs had at one time been present. There remain four cases, 215, 655, 765 and 816, in which there was no history of syphilis obtained. In only one of these, however, *viz.*, 655, was the presence of syphilis proved. In the other three the diagnosis rests upon a strongly positive Wassermann reaction in the mother. How is absence of history in this case to be accounted for? (1) Signs of infection may have been present and purposely concealed or forgotten. (2) Signs of infection may have been altogether absent. (3) A primary sore may have been present where its presence passed unnoticed, *e.g.*, cervix or vagina and secondary symptoms of a mild nature.

But even if we admit that all these nine patients were syphilitic without there ever having been evidence of the presence of syphilis,

there still remain the 70 per cent. of primigravidæ who *gave* signs of syphilitic infection. It is reasonable, therefore, to conclude that at least 70 per cent. of the 47 multiparæ who gave a negative history had at one time suffered from secondary syphilis and that the history was forgotten or purposely concealed.

How many men with syphilis of some years standing give or do not give a history of infection?

The above-mentioned facts are suggestive; the number of cases is, however, too small to enable one to base upon them any dogmatic pronouncement, and the subject must await further clinical investigation.

The Wassermann Reaction.

There has been for long a general consensus of opinion that the Wassermann reaction is considerably modified by the occurrence of pregnancy and that the occurrence of a negative reaction is therefore of little value in the exclusion of syphilis. In order to understand the reasons for the alleged frequency of a negative Wassermann during pregnancy it is necessary to have clear ideas regarding the various theories as to the methods of fœtal infection. This is explained in one of the following ways:—

(1) That paternal infection of the ovum occurs at the time of conception, the mother being healthy and only infected at the time of separation of the placenta. Although the spirochæte has been demonstrated in the spermatozoon infection could not have taken place by the organism in its usual spirillar form, as it is much too large to be contained in the head which alone enters the ovum at the time of fertilization. The theory of paternal infection therefore involves acceptance of the statement that the spirochæta pallida can exist in the form of chromidian granules, or alternatively that the spirochætes present in the semen in the genital canal may gain entrance to the developing embryo whose tissues may be supposed to be highly susceptible and to form a highly favourable medium for their growth. The mother may be saved from infection by the barrier action of the placenta preventing the organisms from passing over into the tissues of the mother. If, however, the infection be a virulent one, that is, if the spirochætes in the embryonic tissues are very numerous, or belong to an unusually virulent strain, the protective action of the placenta may fail and the mother become infected during the course of pregnancy.

Routh [5] suggests that the chorionic ferments prevent the spirochætes from developing beyond the granule stage, and that even if the latter are allowed to pass the placental barrier into the maternal tissues they are there maintained in the granular phase in which they are unable to give rise to the tissue destruction which results in the liberation of proteins, the presence of which in the

serum is the probable basis of the Wassermann reaction. In such cases the infant would be born apparently healthy with a negative Wassermann reaction, but as the inhibitive action of the chorionic ferments passed off the spirochætes would mature, the reaction would become positive and other evidences of syphilis develop. Spirochætes in the granular stage left in the decidua after expulsion of the fœtal part of the placenta would then develop into mature organisms, and invading the maternal tissues no longer protected by the presence of chorionic ferments, would in due course give rise to a positive Wassermann reaction in the mother.

If this theory of paternal infection be correct it would explain not only the absence of a positive Wassermann reaction in the child at birth, but also the alleged presence of a negative reaction in the mother throughout pregnancy and its becoming positive shortly after its termination.

It seems, however, that if such intra-natal infection of the mother occurred, the development of the positive reaction in the blood would be preceded and accompanied by clinical evidences of secondary syphilis. But in this connexion it is interesting to observe that Neisser,[6] in a case of successful intravenous inoculation of a monkey, found that this was followed not by the ordinary signs of syphilis but by a general infection. This would probably be the method of transmission in intra-natal infection, placental separation laying bare the mouths of the blood sinuses as they open on the inner surface of the uterus.

A certain amount of support for Routh's theory of the protective action of the chorionic ferments is obtained from the fact that spirochætes are but seldom found in the placentas of syphilitic fœtuses. It would also explain the fact, which is one of the most remarkable in the biology of syphilis, that spirochætes are never found in abortions below the fourth month, even when such are undoubtedly syphilitic. According to Abderhalden, the chorionic ferments are most active between the 6th and 14th weeks.

Manouélian,[7] however, explains the absence of the spirochæte from the placental tissues in another way. He claims to have demonstrated that in the fœtal placenta a very active phagocytosis by means of mobile elements of the blood—macrophages, polynuclear neutrophiles and eosinophiles—as well as by the fixed cells, especially the endothelium lining the capillaries, takes place. This occurs only in the smallest vessels and capillaries and never in the vessels of larger calibre.

Routh believes that a negative Wassermann reaction in the mother during her pregnancy can only occur when the ovum has been infected by the father's seminal fluid, either at the time of fertilization of after the fertilized ovum has reached the uterine

mucosa. It would seem, however, that this position is untenable as he elsewhere admits that the ferments may also have the power of granulosing the mature spirochætes and thus rendering them inactive. A negative reaction might thus be produced during pregnancy in a woman who was already syphilitic.

While it is difficult to deny the possibility of a purely paternal infection of the ovum by a spermatozoon infected by chromidian granules or of the embryo from infected semen, it seems probable that such a method of infection alone must be extremly infrequent. I myself have not met with a single instance, omitting cases of so-called latent syphilis, in which the mother of a syphilitic child had not a strongly positive Wassermann reaction either during her pregnancy or at the time of confinement. Further, it is rare in my experience for a child that is itself syphilitic to give a negative reaction in the blood from the umbilical cord. One would expect the child in a case of paternal transmission to show a high degree of infection.

(2) That the fœtus is infected from the mother, who has herself been infected by the syphilitic father prior to, or at the time of, conception. It is probable that this is by far the most common method of infecton. Spirochætes existing in the mother's tissues will then only be prevented from infecting the fœtus by the " barrier action " of the placenta. That this may be effective is shown by the fact that a syphilitic mother may give rise to a non-syphilitic child. I have examined the child of a woman who had a repeatedly strongly positive reaction, and a leg ulcer presumably specific. The child had died of asphyxia and the organs showed no trace of disease either on naked-eye or histological examination. Probably such a favourable result only occurs when the infection is an old-standing one or when the mother is infected late in pregnancy.

Nattan-Larrier and Brindeau [8] have, however, proved that the spirilla of relapsing fever can pass from the maternal to the fœtal circulation through the epithelial coverings of the villi and the endothelial walls of the fœtal capillaries. Clearly the earlier the period in pregnancy at which infection occurs the greater will be the chance of infection of the fœtus. If it occurs in the last month or two the fœtus may escape altogether.

Rietschel believes that the placental barrier may be completely effective until its separation commences during labour, when the tearing of villi allows the entrance of spirochætes to the fœtal circulation. Thus, according to him, the infection of the fœtus may be intra-natal only, and he believes that this explains the absence of a positive Wassermann reaction so often found in congenital syphilis. In my experience the Wassermann reaction in congenital

syphilis is usually positive, so that such an explanation is unnecessary.

Further, as spirochætes have been demonstrated in the ova [9] it is at least theoretically possible that infection of the ovum may be transmitted from the mother, although, as Von Reuss [10] points out, it is doubtful whether such ova are capable of development.

(3) That infection may be both paternal and maternal—from an infected spermatozoid or embryo infected from the semen, as well as by organisms from the maternal tissues. In such cases the infection should be a more virulent one than when the mother, or even the father alone is responsible, the developing embryo being as it were attacked from two sides. It is impossible to demonstrate this clinically as spirochætes are but seldom capable of being demonstrated in either the spermatozoid or in the semen even when active secondary syphilis is present. We cannot, therefore, definitely assert that infection is certainly directly paternal as well as maternal, even when both parents are manifestly suffering from florid syphilis. In my experience, however, when both parents show signs of florid syphilis the child more frequently displays evidence of virulent infection than is usual when one or other parent manifests no active symptoms. It is not unreasonable to suppose that in some of these cases the infection may have been derived from both sources.

I must confess that I have failed to find definite evidence that the Wassermann reaction is modified by pregnancy to any marked extent. At the beginning of my work on still-birth I thought that the reaction was frequently negative in mothers of syphilitic children, and that a negative reaction therefore during pregnancy or immediately after delivery was of little or no value in excluding syphilis. The reaction was, I found repeatedly, negative in the mothers of infants who had died from what I supposed to be syphilis. These infants displayed at post-mortem examination the so-called secondary evidences of syphilis, namely, enlarged liver, enlarged spleen, more or less well-marked, or entirely absent, chondroepiphysitis, and fibrosis in various organs, such as thyroid, thymus, lungs, liver and pancreas. *In all cases, however, in which the Wasserman reaction was negative spirochætes were absent from the fœtal tissues.* I have never yet met with a fœtus the organs of which were spirochæte positive while the mother had a negative Wassermann reaction. This raises the question whether we are ever justified in diagnosing fœtal syphilis from the merely secondary signs. It is probably impossible, in the present state of our knowledge to give to this question a definite answer; each case must be judged upon its merits, but it may be said that in the absence of the spirochæta pallida we are never justified in diagnosing syphilis *with certainty.* It is impossible to assert, with

our present scanty knowledge of antenatal pathology, that no other morbid condition than syphilis can give rise to enlargement of the liver and spleen, and to interstitial fibrosis in the fœtal organs. This being so, I do not consider that we are justified in building upon such an insecure foundation any elaborate theories regarding the influence of pregnancy upon the Wassermann reaction.

In order to confirm or refute the conclusions at which I had gradually been arriving in the course of my examination of still-born infants, I examined the records of the Wassermann tests of the 100 cases referred to above (p.). In the Edinburgh Maternity Hospital the Wassermann reactions are carried out at the Royal Infirmary by three serologists, who employ a modification of the Harrison technique. The tests are carried out by each serologist in turn, namely, by Dr. W. R. Logan on one day; next day by Dr. P. McCallum; and on the third day by Dr. Buchanan. By this means the personal element of error in carrying out the test is, as far as possible, eliminated.

A study of the 100 cases with reference to the apparent influence of pregnancy in modifying the Wassermann reaction shows that of the cases of old infection (55 in number) the reaction was strongly positive during pregnancy in 41 (75 per cent.). Of these 41 it was strongly positive at one month in one case, in one case at two months, in four at three months, in one at four months, in two at six months, in 10 at seven months, in four at eight months, and in eight at nine months, while there were 10 others admitted in labour and not seen before, so that the Wassermann reaction during pregnancy was unknown, but during the puerperium it was strongly positive, *i.e.*, in four cases on the day after delivery, in one on the second day, in three on the third day, in one on the sixth day, and in one on the seventh day, so that all these were probably strongly positive during pregnancy also.

The Wassermann reaction was weakly positive (+ +) in eight of the 54 cases. Analysis of these cases gives the following result:—

Case No. 32. W.R. doubtfully positive at three months. No other evidence of syphilis; admitted with incomplete abortion; presence of syphilis doubtful.

Case No. 88. Three-para. W.R. moderately strongly positive at fifth month; history of two previous neo-natal deaths after course of treatment, during present pregnancy W.R. became negative.

Case No. 299. Two-para. W.R. doubtfully positive at ninth month; husband's negative; previous child apparently healthy. No sign or history of syphilis. Syphilis doubtful.

Case No. 232. Primigravida. W.R. weakly positive at seven months. No sign or history of syphilis. Full-time healthy child

born, only one injection N.A.B. (0.15 grm.) had been given. Cord blood negative. No further record. Syphilis doubtful.

Case No. 256. Two-para; pre-eclamptic. W.R. doubtful positive. First child healthy. No signs or history of syphilis. Syphilis almost certainly not present.

Case No. 282. Treated for syphilis during last pregnancy (see case No. 80, page *vide supra*). W.R. weakly positive three days before delivery. Cord blood negative. Child healthy and negative at 10 days old. Mother negative at 10 days after delivery.

Case No. 454. Two-para. First child dead-born at six months. W.R. moderately strongly positive at end of eighth month. The child seemed healthy at birth, but cord blood + + + also at 12 days old; mother's W.R. + + + at 12th day of puerperium.

Case No. 528. Four-para. First child alive and well. Second three months abortion. Third born at eight months—lived four days. W.R. moderately strongly positive at six months. Received six intravenous N.A.B. (2.25 grm.) from then till term; child healthy; cord blood negative.

In four of these eight cases, therefore, syphilis was probably not present. In the others the conditions of the Wasserman reaction was not known previous to pregnancy, and therefore it is impossible to say whether the present pregnancy was the cause of the modification of the reaction. There is, however, no evidence whatever that it was.

Cases of Old Infection with Negative Wasserman Reaction.

These were five in number: four of these were cases of very old standing. In none except one was there any history of infection or evidence of syphilis, excepting that found in the products of conception. Their negative reactions were not due to the pregnancies during which they were under observation as not even between these pregnancies had a positive reaction ever been obtained. They were typical cases of so-called latent syphilis. The exception mentioned above was a primigravida (No. 721) who had come under observation one year before her pregnancy suffering from interstitial keratitis; her W.R. was strongly positive and she received a course of anti-syphilitic treatment, 15 injections altogether (6.15 gr.), so that at the fifth month of pregnancy the W.R. was negative. This was obviously the result not of the pregnancy but of the treatment.

Another very important problem arises in connexion with these cases of syphilis in which the Wassermann reaction is persistently negative. The problem is this: Are these cases syphilitic at all? In none of them was a spirochæte-positive fœtus found, but syphilis was diagnosed from the obstetrical history and from the findings

in the products of conception—the so-called secondary signs of syphilis. Antenatal pathologists well know that there is no more difficult problem in connexion with their work than this: By what criteria are we to diagnose syphilis in the absence of the spirochæte? The history and pathological findings in three of the above five cases will illustrate this difficulty.

Mrs. D., æt. 40; twice married. First marriage 1899.

First child born 1900, normal pregnancy and labour, child alive and well now.

Second child born 1903, normal pregnancy and labour, child alive and well now.

Third child, born 1905, normal pregnancy and labour, died with jaundice, æt. 11 days.

Fourth child, born 1907, normal pregnancy and labour, died with jaundice, æt. 11 days.

Fifth child born 1909, normal pregnancy and labour, still born.

Sixth child, born 1910, normal pregnancy and labour, died with jaundice, æt. two days.

Second marriage occurred after this.

Seventh pregnancy 1912, abortion at two months.

Eighth child born 1913, pregnancy normal, child alive and well, æt. seven.

Ninth child born 1915, pregnancy normal, still born.

Tenth child born 1917, pregnancy normal, still born.

Eleventh child born 1918, pregnancy normal, still born.

Her first husband developed "creeping paralysis" two years after marriage and died in ten years. The seventh to the twelfth pregnancies inclusive were by the second husband.

The mother, anxious to have another living healthy child, came under supervision at the third month of pregnancy. The Wassermann reaction was negative, and she was put upon calcium chloride and advised to have labour induced at $8\frac{1}{2}$ months on account of previous "habitual death" of the fœtus. The pregnancy during the ensuing month appeared to be normal, and at $8\frac{1}{2}$ months labour was induced; a living child was born which developed jaundice immediately after birth and died in 12 hours. The spleen weighed 55 grms., and its weight ratio was 42. In my experience a spleen with a weight ratio over 150 is always syphilitic except possibly in some cases of general fœtal dropsy. The liver was not enlarged but was very markedly hæmopoietic, the sinusoids containing large numbers of lymphocytes. There seemed to be also a rather well marked amount of periportal cirrhosis, but this feature was too indefinite to be diagnostic of syphilis. The same remark applies to the lung. Spirochaetes were not found in any fœtal organ in Levaditi stained sections. The mother's W.R. six

days after delivery was negative, and a third test in the sixth week after delivery was again negative. The woman looks perfectly healthy, denies any history or possibility of specific infection, and points to her three perfectly healthy children as proof of her contention. The husband having emigrated to America prior to her confinement was not available for examination. Mrs. D. afterwards joined him and a letter was given her on her departure giving details of the case. She afterwards turned up at a well-known hospital in New York and was attended there for a three months' abortion. Her W.R. was again negative. In my early work I was satisfied to classify this case as syphilitic; at present I am not at all sure that it is, and think it possible that it represents some obscure familial blood disease allied to that met with in general fœtal œdema. At any rate the absence of spirochaetes precludes any dogmatic assertion regarding the presence of syphilis.

Mrs. L., æt. 26, first came under observation during her fifth pregnancy. No history or signs of syphilitic infection. Her obstetrical history was as follows:—

First child born 1913, full-time, born alive, died at 15 months of German measles.

Second child born 1915, full-time, born alive, died at one year of kidney disease.

Third child born 1916, full-time, born alive, alive now but "not strong."

Fourth child born 1917, full-time, dead one month before.

Fifth child born 1919, full-time. Hydramnios during pregnancy; died at two days old. Slightly jaundiced at birth and abdomen enlarged and tense. Full-time male 3,370 grms. Liver 260 grms., W.R. 12.9. Periportal cirrhosis present. Spleen 25 grms. Weight ratio 134. Levaditi negative. The mother's W.R. was negative. Cord blood not obtained.

Sixth child born 1921, $8\frac{1}{2}$ months, macerated. During this pregnancy she had been under observation at the ante-natal clinic of the Edinburgh Royal Maternity Hospital from the fourth month of her pregnancy. Her W.R. was negative at the fifth month, and again at the sixth month, and the cord blood was also negative. The urine throughout the pregnancy was normal excepting just before delivery when a trace of albumen was detected. No treatment by the arsenical preparations was given but potassium iodide and mercury were administered in mixture.

Three weeks before delivery she ceased to feel fœtal movements; delivery was spontaneous and a macerated fœtus was born. It weighed 2,290 grms.; length 48 cm.; liver 85 grms.; weight ratio 27. Spleen 16 grms.; weight ratio 143. Placenta 800 grms.;

weight ratio 2.8; pale and non-vascular, thickened from maternal to fœtal surface; fœtal organs spirochaete negative.

Seventh child. Never felt well during pregnancy. Only came under observation at eighth month. W.R. then negative; had ceased to feel life two weeks before; urine normal. Received two intravenous injections of N.A.B. (.6gr. in all). Labour spontaneous. Fœtus macerated, slightly premature. Weight 2655 gr.; length 48 cm., from appearance had been dead only about 10 days; liver 110 grms., weight ratio 24, was pale yellow in colour and tough and greenish on section from bile staining. The section was pervaded by fine branching and tree-like wavy lines and greyish-white spots. This was thought to be due to lymphocytes in the sinusoids or to early cirrhosis. The surface was quite smooth and showed no granularity or unevenness. The spleen weighed 18 grms., weight ratio 147. Placenta 565, weight ratio 4.7, pale, non-vascular and thickened; fœtal organs spirochæte-negative.

This case has therefore been under observation in three successive labours, and each time the child has been obtained for examination. There are certain interesting correspondences between the fœtal findings in each case. Thus the spirochæta pallida was never found. In all cases except possibly the first the liver showed no enlargement; in all the spleen was enlarged but never very much exceeded normal limits. This I have elsewhere fixed somewhat arbitrarily at 150. In these three cases it was 134, 143 and 147. The placenta was not obtained in the first, but in the two last showed what are generally described as the typical appearances of syphilis, and its weight ratio was 2.8 (certainly abnormally high) and 4.7 (not abnormally high) respectfully. The Wassermann reaction has been consistently negative. It is difficult to decide whether we are really dealing with a case of syphilis. Certainly absolute signs are absent.

Mrs. F., æt. 36. No history of syphilitic infection. Has bronchitis and emphysema. Urine normal. Came under observation at fourth month for yellow discharge. W.R. negative then and at fifth and seventh month, and again six weeks after delivery.

Obstetric history.

First child born 1905 at six and a half months, still-born.

Second child born 1906 at nine months, alive now but hand and foot have been paralyzed for two years.

Third child born 1907 at six months, still-born.

Fourth child born 1908 at seven months, still-born.

Fifth child born 1909 at seven months, still-born.

Sixth child born 1911 at seven months, still-born.

Seventh, eighth, ninth 10th and 11th were all miscarriages.

Twelfth pregnancy delivered spontaneously of a premature ($7\frac{1}{2}$ to 8 months) macerated fœtus. Weight 1,400 grms., length 43 cm. about four or five days. Liver 70 grms., weight ratio 20. Spleen 12, weight ratio 116 (higher than normal). Organs spirochæte-negative.

The placenta weighed 170 grms., weight ratio 8.2, was small and fairly vascular looking, thin from fœtal to decidual surface and contained a few old hæmorrhages here and there but no white infarcts.

This case was almost certainly not syphilitic.

In all these cases, therefore, of supposed latent syphilis with negative Wassermann reaction the diagnosis of syphilis rested entirely upon such facts as the pathological findings in the fœtus and placenta and upon a bad obstetrical history in the mother. In no cases were spirochætes found in the fœtus. The presence of syphilis has not therefore been proved, for the presence of the spirochæta pallida is the only absolute sign of syphilis. Further, as stated above, I have never yet found a case in which there was a spirochæte-positive fœtus born of a mother whose W.R. was negative. Indeed in every case in which the fœtus was spirochæte-positive the mother had not merely a positive Wassermann but a *strongly* positive Wassermann. Further investigation is needed upon this subject. This can be carried out by observing the W.R. before pregnancy, at intervals *during* pregnancy and again at intervals after pregnancy. It is obvious, however, that such an investigation is likely to be attended by a certain amount of difficulty because cases that come under observation are almost without exception treated at once either before, during or after the termination of the pregnancy, and this will of course modify the reaction.

In the meantime I have found no convincing evidence that the Wassermann reaction is modified to any important extent by the occurrence of pregnancy.

It may be that the spirochætes are present in some modified form as suggested by McDonagh, and that, as suggested by Routh, this is caused by the chorionic ferments, and that the latter may lead to a modification of the W.R. at the same time as or indeed because they granulose the spirochætes. But this does not explain why in one case the fœtus should be spirochæte-negative with a negative W.R. and in another spirochætes should be present and the W.R. positive. In other words why should the ferments act in one case and be impotent in another? Further, I have noted this pecularity, that these spirochæte-negative fœtuses recur in successive pregnancies, that is to say if one is observing a mother in whom latent syphilis is suspected but in whom the W.R. is negative, and one examines the products of conception, the

secondary evidences of syphilis such as enlarged liver, spleen and placenta may be found but no spirochætes, and this condition of matters will probably recur in successive pregnancies. The case of Mrs. L., cited above (page 533), is an example of this. Why should the chorionic ferments be habitually powerful in these cases and always impotent in others?

Again, admitting that some or all of these cases *are* syphilitic, it does not follow that the negative condition of the W.R. is due to pregnancy. In what proportion of old-standing cases of syphilis in men does the W.R. become negative without treatment in course of time? According to my own figures, even if we admit that all the above five cases with negative Wassermann reaction are syphilitic, the reaction has only become negative in 10 per cent. of women who have undergone repeated pregnancy.

It is not an infrequent experience to find a mother suffering from old syphilis and giving a repeatedly strongly positive W.R. while her husband's W.R. is negative. (Nos. 234 and 283 are examples of such cases.) Has the husband in this case escaped infection by his syphilitic wife or has his Wassermann reaction become in course of time negative? If the latter, it goes to show that the reaction tends in course of time, and even in the absence of treatment and of pregnancy, to become negative.

Wassermann Reaction in Cases of Fresh Syphilis.

Out of 46 cases of fresh infection the expectant mother gave a strongly positive reaction in 38 (82 per cent.).

One was at the	3rd	month of	pregnancy.
Two were at the	4th	„	„
Three were	„ 5th	„	„
Five were	„ 6th	„	„
Ten were	„ 7th	„	„
Seven were	„ 8th	„	„
Two were	„ 9th	„	„
Eight were in labour.			

In four the reaction was weakly positive.

Details of these four are as follows:—

No. 45. Mrs. A., 2-para. Condylomata present. Wassermann reaction doubtfully positive at eight months; received six intravenous injections N.A.B. (2.25 gr.) from then till delivery: on day after delivery W.R. negative; also negative 18 days after delivery; child full-time and apparently healthy. The ulcers may not have been true syphilitic condylomata. The patient had a profuse yellow discharge and there was no rash or sore throat. The presence of syphilis is not proven in this case.

No. 80. Mrs. B., primigravida, æt. 21, no history of infection; husband, æt. 32, has recently been under treatment for syphilis. He had contracted syphilis 11 years before in America and on his return had to attend the Edinburgh Royal Infirmary on account of heart disease. This led to diagnosis of syphilis for which he was under treatment during his wife's pregnancy, and led to his wife coming under observation. Her W.R. was negative (fourth month) on two occasions, but doubtfully positive after a provocative N.A.B. She was then given five intravenous injections of N.A.B. together with mercury and tonics. One week before delivery she developed marked jaundice with epigastric pain and vomiting. The urine was bile-stained but contained no albumen. Three days after development of jaundice premature labour set in; a $7\frac{1}{2}$ months child was born which was "blue" from birth and died two days after. At post-mortem examination there were extensive hæmorrhages found in the lungs and cerebral ventricles. The child weighed 1,500 grms., length 42 cm., liver 70 grms., spleen 5 grms. Epiphyses healthy and no spirochætes were found in the fœtal organs. Placenta bile-stained but not enlarged. Cord blood negative. The mother's W.R. was negative one day, ten days and nine weeks after delivery. There is therefore in this case no conclusive evidence of syphilis ever having been present in the mother. The premature labour was probably due to the toxic condition of the mother caused by the combined arsenical and mercurial treatment. This view is supported by the fact that the mother's W.R. was negative nine weeks after delivery, that the child was spirochæte-negative and the cord blood negative.

No. 399. Mrs. D., 4-para. Two children alive and well, third died of pneumonia; all full-time; admitted in labour after normal pregnancy, but husband under treatment for secondary syphilis Mrs. D. had no treatment during her pregnancy. Her W.R. was negative nine days after delivery; cord blood weakly positive (four doses of complement deviated); child full-time, apparently healthy; W.R. negative at eight days old. Weighed 3725 grms. In this case there was no evidence of infection of the mother. It may have been a case of paternal infection of the ovum alone, the mother escaping, but if it had been one would expect a severe infection of the child and that the child's Wassermann reaction would have become strongly positive shortly after birth, or is it an example of conceptional syphilis? Or, again, it is possible that the father had not acquired the disease at the time of conception, and that after acquiring it he had no further intercourse with his wife during the pregnancy. The healthy child rather points to this solution, although the weakly positive cord blood is difficult to explain.

No. 175. N.C., aged 23, 2-para, had multiple condylomata on

vulva and around anus, admitted in labour: no treatment, child apparently healthy, weighed 8 lbs. and was born at full-time. Cord blood negative. Mother's blood weakly positive seven days after delivery.

In the first and last of these four cases, therefore, whatever may have been the effect upon the Wassermann reaction, the signs of syphilis were not modified for well-marked condylomata were present. In the second case (No. 80, page 524) the presence of syphilis in the mother or fœtus is not proved, and as pointed out above the prematurity may have been the result of the arsenical poisoning of the mother, for birth took place while the symptoms were acute. Neither is the presence of syphilis proved in the third case (No. 399).

None of these four apparent exceptions can therefore be adduced as conclusive evidence in support of the statement that the Wassermann reaction is modified by pregnancy.

In only one case was the reaction negative during pregnancy in a recent syphilitic, namely No. 157, and that was after treatment. It has therefore no bearing upon the question at issue.

There is thus among the fresh syphilitics no conclusive evidence that the Wassermann reaction is modified to any marked extent during pregnancy. None of the cases in which there appears to be such a modification are convincing. In none is the evidence incontrovertible.

What would be a convincing case?

The statements in literature upon the two questions under discussion are generally vague, and it would be useful if in future investigators would keep in mind the following points:—

(*a*) The parents should be under observation during the pregnancy. Repeated Wassermann reactions in the mother during pregnancy should be negative. There should be no evidence of primary or secondary syphilis in the mother during her pregnancy.

(*b*) The presence of syphilis in the husband should be beyond doubt. Preferably it should be in the secondary stage, as it is possible that in the tertiary stage he may not infect his wife.

(*c*) The mother should be known not to be suffering from old-standing syphilis which would prevent a reinfection during the pregnancy.

(*d*) The fœtus should be syphilitic, it being kept in mind that the only absolute evidence of the presence of syphilis is the finding of the spirochæta pallida in the fœtal tissues.

(*e*) The patient should be observed for the appearance of a strongly positive Wassermann reaction in the months following delivery; or after the menopause when the special protective substances that are supposed to be present in the serum of women, and especially of pregnant women, are said to disappear.

Comparison of the mother's Wassermann reaction with the reaction of the cord blood.

Out of a total of 53 cases of syphilis in which the mother's and cord blood W.R. were obtained the results were as follows:—

Both strongly positive	in 20	or 38	per cent.
Both negative after treatment of the mother	„ 7	„ 13	„
Mother's blood more strongley positive than the cord blood	„ 17	„ 32	„
Mother's blood less strongly positive than cord	„ 2	„ 4	„
Reactions not comparable	„ 7	„ 13	„

(In the seven cases in which the reactions are not comparable, although the mother's blood had been strongly positive early in pregnancy, in all cases a fairly long course of treatment had been given and continued up till time of onset of labour and no W.R. had again been taken during the pregnancy. It may or may not have been altered by the treatment. As the mother's W.R. immediately before delivery therefore was not known, one cannot usefully compare the reaction of the cord blood with it.)

The above tables show that there is a tendency for the reaction of the cord blood to be somewhat weaker than that of the mother. I would suggest that this may be due to the fact that the cord blood obtained for the W.R. is venous, and therefore pure blood. It would correspond to arterial blood in the adult.

Summary.

1. In cases of old-standing syphilis in multiparæ a history of infection or of primary or secondary manifestations is rarely given (2 per cent.), while in primigravidæ signs of syphilis are usually present at time of examination (70 per cent.). When such evidences are not present in a primigravida, she is usually elderly with an old-standing infection. As every multipara has been a primigravida at some period, this seems to prove that the reason why a history is not found in multiparæ is not that it has never been present but that it has been forgotten or is knowingly denied. There seems to be no escape from this conclusion.

(2) A study of the Wassermann reactions in 100 cases of syphilis during pregnancy suggests that pregnancy has little or no influence in modifying the Wassermann reaction.

(3) The Wassermann reaction on the blood from the umbilical cord is a reliable means of diagnosis of syphilis in the child. The reaction differs but little from that of the mother's blood, but on the whole tends to be slightly less strongly positive than the latter. It is suggested that this may be due to the fact that it is purified (arterial) blood obtained from the umbilical vein.

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Studies of the Toxæmias of Pregnancy as they occur in Glasgow.

1. Incidence and Mortality (Indoor Cases).

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As a preliminary to a study of the toxæmias of pregnancy which the writer and his colleagues have commenced in the Research Department of the Glasgow Royal Maternity and Women's Hospital, it was considered desirable to obtain some information with regard to the incidence of such conditions in the population from which the material to be studied is taken. With this end in view the records of the Hospital for a period of ten years have been examined, and the results of this examination form the basis of the following remarks.

It is not proposed to attempt to summarize here the very extensive literature which has grown up around the subject of the toxæmias of pregnancy, but reference to the views of other workers upon certain points will be made as they arise. The writer wishes at the outset to point out that his figures with regard to incidence are based upon Hospital statistics, and that such statistics cannot be taken as an estimate of the actual frequency of the conditions dealt with in the population generally. While the value of the results is subject to this limitation, the information obtained from them is of use in indicating the frequency of the different forms of toxæmia relatively to one another, and in comparing the hospital admission-rate for these conditions in various centres of population.

One cannot but be struck by the apparent differences in the type of toxæmic case—and particularly in the type of eclamptic case—which predominates in various countries. While it is difficult to be certain of the actual extent of these differences, there seems to be little doubt that such variations do occur. They must be an important factor in the differences in the mortality rate of eclampsia and of other forms of toxæmias of pregnancy which appear in the published records of those writers who have attempted

to discover what method of treatment is most effective. It is thus fallacious to make a direct comparison between the results of treatment say in London or Dublin and those in Glasgow or Edinburgh, for in the latter cities the toxæmias of pregnancy are of more frequent occurrence (in hospital at least) and appear to be of a more severe type than in the former. For these reasons it is clearly desirable to ascertain the incidence rate of the predominant clinical types of toxæmia which are found in any locality in which an inquiry into the incidence of these complications of pregnancy is to be carried out.

In addition to an investigation of the incidence of eclampsia and other forms of toxæmia of pregnancy in the cases admitted to the Hospital, consideration has been given to the fœtal and maternal death-rate from eclampsia.

Classification of Cases.

For the purposes of the present investigation the following classification of cases has been adopted :—

1. Hyperemesis gravidarum.
2. Albuminuria and nephritis.
3. Pre-eclamptic toxæmia.
4. Eclampsia.

This classification, it must be admitted, is not a satisfactory one, but it is the only one possible in dealing with such records as are available. The period covered by the inquiry includes the years of the war during which the staff was depleted, and house surgeons were constantly changing. To attempt any more detailed subdivision of the cases would lead only to inaccurate results. So far as they go, however, the figures may be regarded as reliable.

Results.

1. *Incidence of Hyperemesis Gravidarum.*

No attempt has been made to distinguish between neurotic and purely toxæmic cases of hyperemesis gravidarum. In the present state of our knowledge such a distinction must depend to a large extent upon the views of the particular clinician who observes the case. Reference to recent discussions on the subject demonstrates to what an extent such views may vary. The figures are given simply as they were recorded from time to time by the physicians of the Hospital. Of the total 23,630 cases admitted to the Hospital during the ten-year period 1913—1922, 302 were diagnosed as hyperemesis gravidarum. The percentage of cases so diagnosed varied from year to year—ranging from 0.50 per cent. in 1918 to 1.70 per cent. in 1914 and in 1919. The average percentage of total admissions diagnosed as hyperemesis gravidarum was 1.21.

2. *Incidence of Albuminuria and Nephritis.*

An attempt to separate the cases of chronic nephritis from cases of toxic albuminuria was abandoned when it became evident that the data were inadequate for the purpose. Pyelitis, cystitis and renal calculus, whenever recognized as such, have been excluded, however, from the series, as have also cases of transient albuminuria. The average yearly incidence of albuminuria and nephritis in the ten-year period (1913—1922) was found to be 2.8 per cent. of the total cases admitted. The percentage incidence varied from 2.12 in 1913 to 4.10 in 1921. There was a steady rise from 1913 to 1916 (2.90 per cent.), a slight fall in 1917, and a further fall to 2.30 in 1918, then a sharp rise in 1920 to 1921 (3.70 and 4.10 respectively). In 1922, however, the percentage fell to 2.70.

3. *Incidence of Pre-Eclamptic Toxæmia.*

Under this heading have been grouped a number of toxæmic cases of which the majority appear to have corresponded with the type so designated by Williams and others. The actual nomenclature employed in the records has varied from time to time, however. Three cases of acute yellow atrophy of the liver have been included in this group, partly for convenience, and partly because there was no post-mortem confirmation of the diagnosis. The figures are as follows:—

TABLE I.

Year.	Number of cases of pre-eclamptic toxæmia.	Percentage of total cases admitted.
1913	1	0.07
1914	5	0.3
1915	2	0.12
1916	6[1]	0.3
1917	0	0
1918	1	0.05
1919	2	0.07
1920	10[2]	0.27
1921	6	0.16
1922	8	0.22
Total	41	
Average (per year)	4	.16

1.=1 case of acute yellow atrophy.
2.=2 cases of acute yellow atrophy.

4. *Incidence of Eclampsia.*

During the ten-year period from January 1913, to December 1922, inclusive, there were admitted to the Hospital 814 cases of eclampsia. As the total number of patients admitted during that period was 23,630, the average number of eclamptic cases admitted each year was 81, or 3.6 per cent. of the whole 23,630 cases admitted.

TABLE II.

Year.	Number of cases of eclampsia.	Percentage of total cases admitted.
1913	64	4.5
1914	96	6.1
1915	73	4.9
1916	66	3.7
1917	54	3.1
1918	60	3.0
1919	81	3.2
1920	109	3.0
1921	106	2.8
1922	105	2.9
Total	814	
Average (per year)	81	3.6

TABLE III.

Percentage of admissions which were eclamptic.

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	Average
Jan. ...	5.1	6.7	6.6	2.1	5.9	3.5	2.43	2.8	4.4	2.9	4.2
Feb. ...	7.2	5.6	4.0	0.7	3.8	1.4	1.85	3.7	3.3	1.6	3.3
March ..	4.5	7.3	3.9	5.2	2.6	3.3	2.85	4.6	4.0	3.9	4.2
April ...	2.6	0.7	3.3	6.4	5.5	6.0	1.78	2.2	2.5	2.7	3.3
May ...	3.1	8.2	7.5	4.3	4.0	1.7	3.25	3.6	3.2	2.6	4.1
June ...	3.8	4.6	4.0	4.0	3.0	1.4	3.6	2.6	3.2	3.5	3.4
July ...	2.3	9.0	5.3	3.6	2.9	2.7	3.2	2.5	3.0	2.6	3.5
August	4.4	4.5	4.6	3.2	0	0.6	4.56	1.4	3.7	5.1	3.1
Sept. ...	6.0	5.8	8.7	2.7	2.3	4.9	1.90	2.8	1.2	2.5	3.9
Oct. ...	4.5	4.9	4.7	4.4	0.7	4.3	3.86	3.7	2.6	2.1	3.5
Nov. ...	2.6	6.5	5.0	3.6	4.0	2.4	2.14	3.7	1.5	2.8	3.4
Dec. ...	8.4	9.3	2.2	3.3	2.3	4.6	3.33	2.7	1.8	2.3	4.0
Average	4.5	6.1	4.9	3.7	3.1	3.0	3.2	3.0	2.8	2.9	3.6

Reference to the above tables shows that while in 1913 the percentage incidence of eclampsia was four and a half, and in 1914 a little over six, from 1915 onwards there has been a decrease, the figures having remained practically stationary around three per cent. for several years.

It will be noticed also that there is a marked variation in the percentage of cases of eclampsia admitted during each month in any particular year, and, further, that no one month shows any constancy in the incidence rate throughout the years.

With regard to the actual incidence of eclampsia in the series of cases, it is interesting to compare the above results with those collected by Whitridge Williams, and quoted below.

TABLE IV.

Percentage incidence of eclampsia in hospital.

Goldberg (Dresden, 1891)	10,717 labours	—0.75 per cent.	
Cassamayor (Paris, 1892)	16,225 cases	—0.61	„
Knapp (Prague, 1900)	7,636 „	—0.53	„
Newell (Boston, 1900)	6,700 „	—1.17	„
Reinburg (Paris, 1905)	26,511 „	—0.34	„
Lichtenstein (Leipzig, 1911) ...	14,836 „	—2.68	„
Williams (Baltimore, 1912)... ...	11,000 „	—1.00	„
Veit (from various sources, 1895) ...	149,366 „	—0.60	„

(Quoted by Williams, *loc. cit.*)

It will be seen that in none of the series quoted is there so high an incidence of eclampsia as was found in the series investigated by the writer.

Ante-partum, Intra-partum and Post-partum Eclampsia.

Owing to the impossibility of making a distinction between ante-partum and intra-partum eclampsia from the information available, it was decided to divide the cases simply into two categories: (i) those in which the convulsions began before or during labour, and (ii) those in which the convulsions began after delivery. When the cases were so grouped it was found that of the total 814 there were 639 (78.5 per cent.) in which the fits began before delivery, and 175 (21.5) in which the fits began after delivery. The frequency of ante-partum and intra-partum eclampsia was thus between three and four times that of post-partum eclampsia.

Relative Incidence in Primigravidæ and Multiparæ.

Of the 814 cases of eclampsia there were 530 (65.1 per cent.) primigravidæ and 284 (34.9 per cent.) multiparæ. As the proportion of primigravidæ admitted to the Hospital is high, a control series of 800 cases were taken at random from the register for comparison. It was found that in this series of 800 unselected cases—spread over the ten-year period under discussion—the proportion of primigravidæ to multiparæ was 1 to 1.72. This shows, compared to the ratio of 1 to 0.53 in the eclamptic cases, that eclampsia was about twice as common in primigravidæ as in multiparæ.

In the reports of the 1922 Congress of Obstetrics and Gynæcology at Liverpool (*loc. cit.*) the *mean* proportion of primigravidæ to multiparæ was 69.3 per cent. of the former to 30.7 per cent. of the latter. (The proportion of primigravidæ varied from 67.15 in Dublin and in the Midlands to 75 per cent. in Edinburgh.)

Age of the Patient and the Incidence of Eclampsia.

There was a reliable record of the patient's age in 806 of the eclamptic cases in the series. The following table V. shows the number of cases in each year of age from 13 to 46, primigravidæ and multiparæ being given separately. This table also shows for comparison the ages of primigravidæ and multiparæ in the unselected control series referred to above.

When those results are compared graphically as in the accompanying figs. A and B, it is seen (*a*) that there was a tendency for eclampsia to occur in primigravidæ from 30—40 years of age or so, and (*b*) that in multiparæ the influence of advanced age was still more marked.

TABLE V.

Table showing Age Incidence in Eclampsia Series and in Control Series.

	Eclampsia Cases.				Control Series. (Unselected cases).		
Age	Primigravidæ.	Multiparæ.	Total.		Primigravidæ.	Multiparæ	Total.
13	1	0	1	.....	0	0	0
14	0	0	0	.....	2	0	2
15	3	0	3	.....	1	0	1
16	6	0	6	.....	8	0	8
17	16	0	16	.....	11	0	11
18	26	0	26	.....	15	0	15
19	47	0	47	.....	18	4	22
20	52	1	53	.....	45	10	55
21	42	6	48	.....	33	16	49
22	37	7	44	.....	30	21	51
23	41	12	53	.....	26	27	53
24	37	10	47	.....	18	37	55
25	31	17	48	.....	15	26	41
26	31	18	49	.....	12	23	35
27	22	18	40	.....	11	36	47
28	25	12	37	.....	9	31	40
29	12	10	22	.....	8	31	39
30	18	20	38	.....	5	26	31
31	11	14	25	.....	5	20	25
32	13	13	26	.....	4	20	24
33	9	15	24	.....	3	13	16
34	6	13	19	.....	4	25	29
35	5	13	18	.....	2	17	19
36	4	13	17	.....	4	26	30
37	1	12	13	.....	0	20	20
38	4	22	26	.....	1	16	17
39	4	9	13	.....	0	14	14
40	3	9	12	.....	2	19	21
41	0	5	5	.....	0	7	7
42	5	7	12	.....	1	9	10
43	0	7	7	.....	0	5	5
44	1	3	4	.....	0	6	6
45	1	4	5	.....	0	0	0
46	0	1	1	.....	0	0	0
47	0	0	0	.....	1	0	1
48	0	1	1	.....	0	1	1
Totals	514	292	806	.....	294	506	800

FIG. A.

Age Incidence of Eclampsia in Primigravidæ.

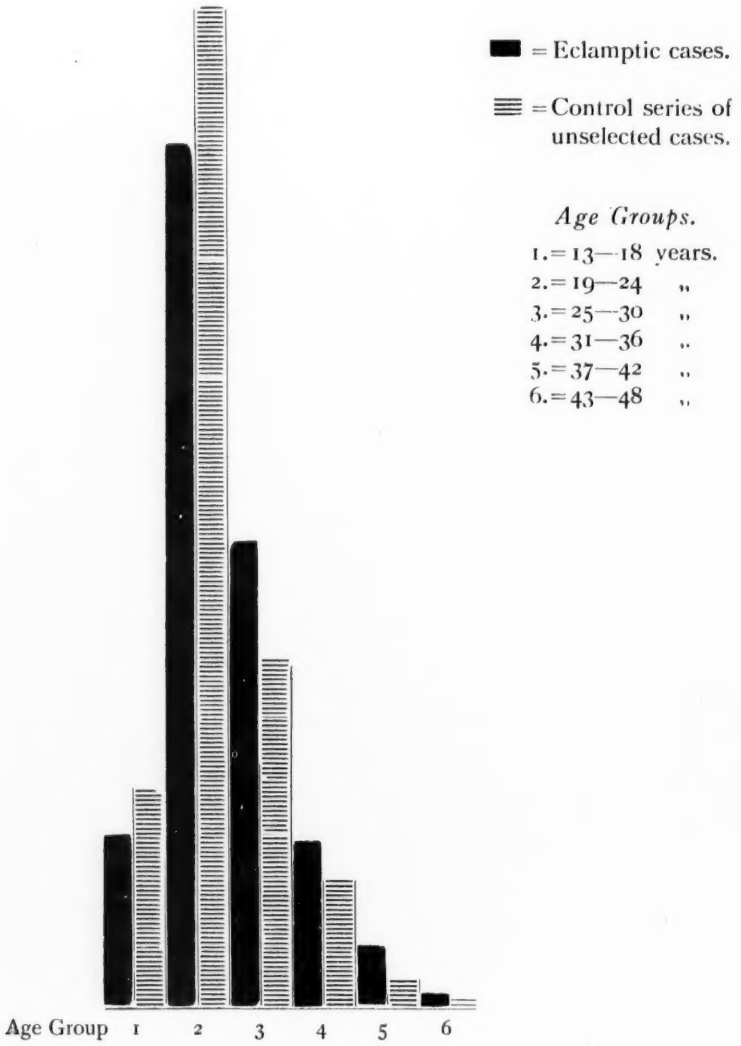
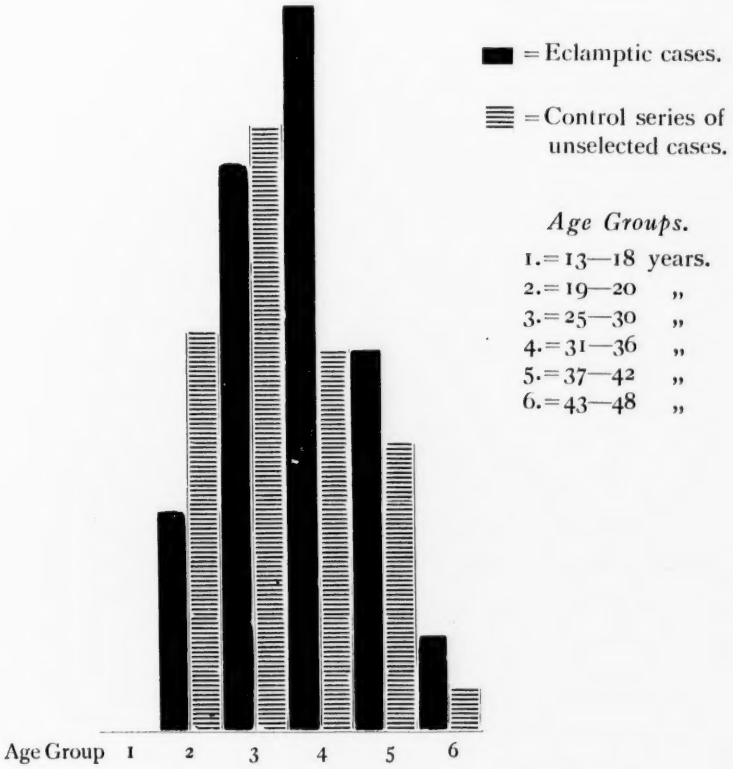


FIG. B.

Age Incidence of Eclampsia in Multiparæ.



Number of Pregnancies and Incidence of Eclampsia.

As has been shown above, the series of 814 cases of eclampsia contained 65.1 per cent. primigravidæ and 34.9 per cent. multiparæ, while in the control series of 800 the proportion of multiparæ was 63.25 per cent.

The multiparæ were further divided according to the number of pregnancies, as follows :—

TABLE VI.

Number of Pregnancy.	Eclampsia Series —806 cases. %	Control Series —800 cases. %
2nd	25.7	31
3rd	16.5	14.4
4th	14	11.8
5th	11.2	6.5
6th	4.9	7.9
7th	6.3	8.9
8th	5.9	5.7
9th	3.8	4.5
10th	4.5	3.4
11th	2.8	2.7
12th	1.4	1.2
13th	1.4	.8
14th	.7	.8
15th	.3	—
16th	—	.2

The above figures show no marked relation between the degree of multiparity and the incidence of eclampsia, but indicate that from the twelfth pregnancy onwards there is a slightly greater tendency for eclampsia to occur than in the earlier pregnancies from the second to the eleventh.

The very marked tendency for eclampsia to occur in primigravidæ in the series has been noted in a previous paragraph.

Maternal Mortality.

As the accompanying table shows, the maternal mortality in the series of eclamptic cases is high. It ranged from 15.6 per cent. in the year 1920 to 31.6 per cent. in 1918, and the average for the whole ten-year period was 22.4 per cent. During the same period the maternal death-rate for all cases admitted to the Hospital ranged from 3.1 per cent. in 1922 to 5.4 per cent. in 1916, with an average of 3.8 per cent.

When cases of ante-partum and intra-partum eclampsia are considered separately from those of post-partum eclampsia, it is seen that in the former group the death-rate ranged from 18.4 per cent. to 34.7 per cent., with an average of 23.5 per cent., while in the latter group the death-rate varied from 6.9 per cent. to 33.3 per cent., with an average of 18.2 per cent.

In the series of eclamptic cases the death-rate among primigravidæ was 20.1 per cent. (21.8 per cent. for ante-partum and intra-partum eclampsia, and for post-partum eclampsia 14 per cent.).

Among multiparæ the death-rate from eclampsia was 26.7 per cent., 26.3 per cent. for ante-partum and intra-partum cases, and 28.3 per cent. for post-partum cases.

TABLE VII.—*Maternal Mortality.*

Year.	No. of cases of Eclampsia.	No. of Deaths in Eclampsia Series.	Percentage of Deaths in Eclampsia Series.
1913	64	15	23.4
1914	96	19	19.8
1915	73	15	20.5
1916	66	19	28.8
1917	54	14	25.9
1918	60	19	31.6
1919	81	24	29.6
1920	109	17	15.6
1921	106	19	17.9
1922	105	22	20.9
Total	814	183	22.4

It is evident from the above figures that the death-rate from eclampsia has shown considerable variation in the period under review, though without any regular downward tendency.

The death-rate from ante-partum and intra-partum eclampsia was much higher than that from post-partum eclampsia (the respective percentages being 23.5 and 18.2).

Among primigravidæ the general death-rate from eclampsia was lower than that among multiparæ. The greater mortality from ante-partum and intra-partum eclampsia as compared to post-partum eclampsia was well marked. Among multiparæ, however, there was very little difference in the death-rates from ante-partum and intra-partum eclampsia on the one hand and post-partum eclampsia on the other. The general death-rate from eclampsia was, however, distinctly higher among multiparæ than among primigravidæ.

In the reports presented to the British Congress of Obstetrics and Gynæcology in 1922, the figures for the comparative maternal mortality in primigravidæ and in multiparæ were as follows:—

London, 23.4 per cent. for primigravidæ and 27.0 per cent. for multiparæ.

North of England, 20.6 per cent. for primigravidæ and 27.8 per cent. for multiparæ.

Midlands, 23.8 per cent. for primigravidæ and 27.5 per cent. for multiparæ.

The Effect of Eclampsia on the Fœtal and Infantile Death-Rate.

In 235 (28.8 per cent.) of the 814 cases of eclampsia the pregnancy ended in the birth of a mature living child, in 87 (10.6 per cent.) the child was premature but alive, and in 252 (30.9 per cent.) the child was stillborn (119 being mature and 133 premature but viable). Of the remaining cases 20 resulted in miscarriage or abortion, 95 were dismissed undelivered, and 125 were delivered before admission to Hospital. As the information with regard to infants born before the mother's admission to Hospital is scanty, the group of such cases has been omitted in considering the death-rate among infants. The following figures are based, therefore, on 689 cases instead of on the entire series of 814 cases.

The figures regarding the result of the pregnancy are shown for each year in the following table:—

TABLE VIII.

Year.	Mature still-born.	Premature still-born.	Mature live-born.	Premature live-born.	Mis-carriage or Abortion.	Dismissed Undi-livered.	Total.
1913	12	9	16	8	3	4	52
1914	20	18	19	8	1	13	79
1915	14	15	18	7	0	9	63
1916	6	17	14	10	0	10	57
1917	4	11	20	5	1	5	46
1918	13	10	17	4	0	8	52
1919	9	10	24	7	3	10	63
1920	11	12	34	10	5	14	86
1921	16	15	33	11	4	9	88
1922	14	16	40	17	3	13	103
Totals	119	133	235	87	20	95	689
Per-centages	17.3	19.3	34.1	12.6	2.9	13.8	

Of 574 viable fœtuses born of eclamptic mothers, 354 were mature and 220 were premature. The percentage of premature births in all the cases in which the pregnancy resulted in the birth of a viable fœtus was, therefore, 37.3. In a control series of unselected cases it was found that the incidence of premature birth was approximately 20 per cent. of all pregnancies in which a viable fœtus was born.

Of the 322 infants which were born alive of eclamptic mothers, 235 were mature and 87 were premature. During the first ten to fourteen days of life the death-rate among these infants was 27 per cent. (17 per cent. for the mature and 54 per cent. for the premature). Amongst all the cases admitted to the Hospial during three years ending December, 1922, the death-rate for infants was 8.4 per cent.

This death-rate of 27 per cent. among the live-born infants of eclamptic mothers though high, compares favourably with the figures given in the Reports of the 1922 Congress, viz. :—

TABLE IX.

	Total number of infants (born alive).	Survived (*i.e.*, left hospital alive).
London	448	242 = 54.0 per cent.
Edinburgh	207	84 = 44.4 „
Dublin	204	134 = 65.6 „
Midlands	133	69 = 52.0 „
North of England	?	? = 43.4 „
Glasgow (present series)	322	235 = 73.0 „

The infantile death-rates in eclamptic cases during each of the ten years under review are shown in the following table :—

TABLE X.

Infantile Death-Rate in Eclamptic Cases.

Year.	Mature. %	Premature. %	Total. %
1913	0	87.5	29.1
1914	15.7	75	33.3
1915	22.2	42.8	28
1916	21.3	60	37.5
1917	20	40	24
1918	23.5	0	19
1919	33.3	71.4	41.9
1920	14.7	70	27.2
1921	18.1	45.4	25
1922	7.5	35.2	15.7
Average ...	17	54	27

NOTE.—During the three-year period 1920—1922 the average annual infantile death-rate for all cases admitted to the Hospital was 8.4 per cent.

The conclusions deduced from the above figures with regard to the infantile and fœtal death-rates in eclampsia are (1) The pregnancy ended in still-birth about three times as frequently in eclamptic cases as in unselected hospital cases; (2) Among the live-born infants of eclamptic mothers the death-rate was more than three times the general infantile death-rate in the Hospital; (3) Premature birth was distinctly more frequent in eclamptic cases than in a control series of unselected cases; (4) There was a particularly large number of deaths among the premature infants of eclamptic mothers.

Summary and Conclusions.

1. The incidence of the various forms of toxæmia of pregnancy was investigated in a series of 23,630 cases admitted to the Glasgow Royal Maternity and Women's Hospital between January, 1913, and December, 1922 (*i.e.*, ten years).

2. Over the ten-year period reviewed there was an average incidence of hyperemesis gravidarum of 1.21 per cent.

3. The average incidence of albuminuria and nephritis was 2.84 per cent.

4. The group of cases included under the term pre-eclamptic toxæmia comprised, on the average, 0.15 per cent. of all cases admitted.

5. Eclampsia was found on the average to be present in 3.6 per cent. of cases, but the incidence varied in different years from 2.8 per cent. to 6.1 per cent.

6. Of the 814 cases of eclampsia, 78.5 per cent. had fits ante-partum or intra-partum, while in the remaining 21.5 per cent. fits were post-partum in their onset.

7. 65.1 per cent. of the cases of eclampsia occurred in primigravidæ and 34.9 per cent. in multiparæ. When a correction was made to allow for the high proportion of primigravidæ among the total cases admitted, eclampsia was found to be about twice as common in primigravidæ as in multiparæ.

8. The highest incidence of eclampsia was in the age group 19—21 years. In primigravidæ the greatest frequency was in the age group 19—21, and in multiparæ in the age group 25—27. After comparison with the percentage of total cases admitted in each age group, it was found that while there was a distinct tendency for eclampsia to occur in the older primigravidæ, the influence of advanced age was much more marked in multiparæ, though the degree of multiparity had little relation to the frequency of the condition.

9. With regard to maternal mortality it was found that the

death-rate varied from 15.6 per cent. to 31.6 per cent., with an average of 22.4 per cent. The death-rate for all cases admitted during the same period ranged from 3.1 per cent. to 5.4 per cent., with an average of 3.8 per cent. The average death-rate from ante-partum and intra-partum eclampsia was 23.5 per cent., and from post-partum eclampsia 18.2 per cent.

10. Of the 689 pregnancies in eclamptic women, 34.1 per cent. ended in the birth of a living mature child, 12.6 per cent. ended in the birth of a living premature child, and 36.6 per cent. ended in still-birth (17.2 per cent. mature and 19.4 per cent. premature). Of the remaining 115 cases 20 resulted in abortion and 95 were dismissed undelivered. In comparison with the figures for unselected cases admitted to the Hospital, still-birth was found to be about three times as frequent in eclamptic cases as in general admissions to the Hospital. Premature birth was also distinctly more common in the series of eclamptic cases than in an unselected control series.

11. Of the 322 children born alive of eclamptic mothers 27 per cent. died within 10—14 days of birth (17 per cent. mature and 54 per cent. premature). The death-rate for unselected live births in the Hospital was 8.4 per cent. There was thus seen to be a death-rate among the infants of eclamptic mothers of more than three times the general infantile death-rate in the Hospital.

The above results emphasize in a remarkable way the importance of eclampsia as a cause of loss of fœtal and infant life.

It gives the writer great pleasure to acknowledge his indebtedness to Miss A. Neilson for her assistance in collecting the data contained in this study.

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Röntgenographic Pelvimetry.*

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Since the beginning of my work in this field five years ago, when I briefly described a method of measuring the pelvis, several other factors pertaining to the use of X-rays in obstetrics have been elicited and are worthy of consideration.

Ante-Natal Treatment.

It is an acknowledged fact that the true conduct of labour commences with ante-natal treatment. During this period of supervision the chief duty of the doctor is to see that his patient is physically fit to deliver herself of a normal child. Munro Kerr and Holland, writing on Cæsarean section, showed by statistics that 80 per cent. of the operations performed in this country were for contracted pelvis, and that the mortality in those cases in which vaginal examination, or forceps delivery had been attempted before the operation was 27 per cent., compared with 1.6 per cent. in which pre-labour diagnosis had been made, and the operation performed without vaginal interference. Here, therefore, we have a maternal mortality of 25 per cent. which could have been greatly reduced if not altogether avoided if ante-natal supervision had been efficient. The X-rays, besides demonstrating pelvic deformities, the effect of old fractures or diseased joints, make it possible not only to see the existence and extent of the pelvic contraction, both of the inlet and outlet, but also to compare the abnormal with the normal pelvis, and measure the degree of contraction. Every woman should have her pelvis measured by the X-rays to see if she is fitted for child-bearing, and towards the end of her pregnancy, according to the degree of her contraction, if any abnormality is noted, another photograph should be taken to ascertain the presentation of the child, and its size relative to that of the pelvis, thereby giving a definite diagnosis, and enabling the case to be treated by a suitable method.

*Read at the Annual Meeting of the British Medical Association, Portsmouth, July 1923.

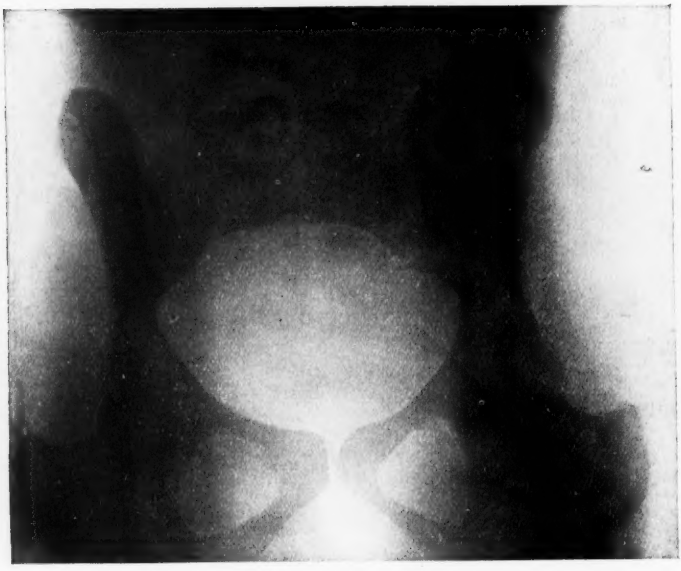

FIG. 1.—AN ABNORMAL PELVIS.

EXTERNAL.—Showing considerable narrowing and apparent flattening of the Iliac bones more marked on the right side. At the level of the antero-inferior spines the bones are distinctly narrower than normal.

INTERNAL.—On comparison with the "standard" the inlet was normal.

FIG. 4.—NORMAL PELVIS.

Pelvimetry.

The addition of Röntgenography to our obstetrical resources enables us not only to see the size and shape of the mother's pelvis, and of the fœtal head, and the relations of the one to the other, but also to measure the pelvic diameters, both of the inlet and the outlet without vaginal examination.

Since the existence of contracted pelvis was first reported by Arantius various methods have been employed for measuring the extent of a pelvic deformity, if present.

External pelvimetry introduced by Baudeloque, while enabling us to measure directly the external pelvic diameters, and thence to draw certain conclusions as to the degree of contraction, is insufficient for estimating the size of the pelvic cavity. This cannot be done directly in the living woman, except during a laparotomy.

Every obstetrician has encountered cases which appeared on external examination to be normal, but when labour was advanced unlooked-for difficulties presented, when it was too late to do an abdominal operation.

In the same way one meets cases in which there is external pelvic deformity and in which one anticipates a difficult confinement, but in which, on the contrary, labour is quite unobstructed and the infant is of average size. This type of case is well shown in skiagram number 1, in which the abnormality is due to deformity of the iliac bones, the pelvic cavity being normal.

Fig. 1 represents the pelvis of a healthy primigravida seven and a half months pregnant. She consulted her own doctor as to his prognosis of a normal labour. He found, on external pelvimetry, that the distance between the anterior superior spines was only 8 in., and that between the iliac crests 9½ in. She was sent to me for X-ray pelvimetry.

External. On comparing her X-ray plate with the " standard " there is considerable narrowing and apparent flattening of the iliac bones, more marked on the right side. When worked out, the amount of contraction compares favourably with the doctor's direct measurements.

Between Iliac Crests.	Pelvis.	Skiagram.
Standard	28 cm.	32.5 cm.
Mrs. I.	23 cm.	26.8 cm.

At the level of the antero-inferior spines the bones are distinctly narrower than normal.

Internal. On comparison with the "standard" the inlet appears normal, and when worked out it is as follows :—

	Antero-posterior.		Transverse.	
	Pelvis.	Skiagram.	Pelvis.	Skiagram.
Standard ...	11.5 cm.	13.5 cm.	13.6 cm.	15.9 cm.
Mrs. I. ...	11.5 cm.	13.6 cm.	13.6 cm.	16.0 cm.

This case demonstrates clearly the advantages of this method of pelvimetry and the fallacy of depending on external measurement.

Internal pelvimetry. A method was devised by Skutsch which made it possible to estimate the size of the pelvic cavity indirectly and with fair accuracy, but the employment of his instrument necessitates an anæsthetic, if discomfort or actual pain to the patient is to be avoided.

The Röntgen rays, it was thought possible, might afford a valuable method of investigating the size and shape of the pelvis, but it was found that, while an excellent idea as to shape was obtained, that as to size was erroneous, owing to the fact that the sacrum and pubes lay at different levels from the sensitive plate, and consequently one portion of the pelvis was enlarged out of all proportion to the other. This defect made it impossible to utilize radiography for purposes of mensuration.

The employment of the following method will obviate this difficulty, and make it possible not only to see the existence and extent of the pelvic contraction, both of the inlet and the outlet, but also to compare the pelvis under examination with the normal pelvis, and to measure its diameters without causing any appreciable inconvenience to the patient.

Position of Pelvis.

Before discussing the technique of this method of pelvimetry a few anatomical facts on the position of the pelvis should be noted. In the erect posture the pelvis is placed obliquely with regard to the trunk of the body. The promontory of the sacrum, in well-formed females, is nearly four inches above the upper border of the symphysis pubis.

Fig. 2. The plane of the pelvic inlet, or true conjugate, forms an angle of about 65 degrees with the horizontal plane. Therefore with an antero-vertical plane it will form an angle of about 25 degrees. If the plane of the inlet is bisected by a line at right angles, one extremity will pass through the middle of the coccyx, and the other

through the umbilicus. The axis of the pelvic inlet is therefore directed downwards and backwards.

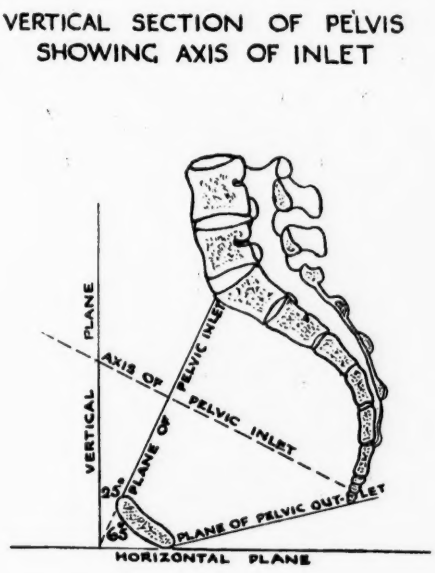

FIG 2.

Technique.

Fig. 3. The patient lies flat, face downwards, on the table, with her symphysis pubis touching the plate carrier. The X-ray tube is raised two feet above the plate and focussed on a point four inches below the mid-point of a line joining the posterior iliac spines; this point corresponds to about the middle of the coccyx. The tube is then tilted forward through an angle of 30 degrees, towards the patient's head, and it will then lie parallel with the plane of the pelvic inlet. The rays will thus be directed upwards and forwards in the axis of the true conjugate, and an excellent image of the pelvic cavity will be obtained on the plate.

In this technique there are three constant factors:—

1. The point of focus.
2. The X-ray tube at the same angle to and at the same distance from the sensitive plate.
3. The relation of the symphysis pubis to the sensitive plate.

Having these three fixed points, and using the shadow of the

symphysis pubis as an axis, we can accurately measure any object within the "tube radius."

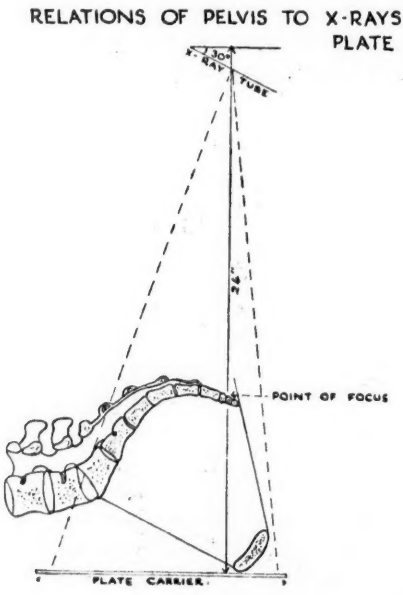

FIG. 3.

The possibilities of error in interpreting the size of the inlet, because of the varying degree of tilting of the different pelves are negligible in this method of pelvimetry. In a contracted pelvis the angle which the plane of the pelvic inlet makes with the horizontal is greater than the normal, and the angle with the vertical will be correspondingly reduced. In a contracted pelvis, the promontory of the sacrum will be nearer the plate than the normal, and be more easily defined.

Method of measuring.

In a normal pelvis, which is designated the "standard pelvis" the various diameters, both external and internal, are accurately measured. When this pelvis is radiographed definite points can be marked on the plate; the distance between these points will bear a definite ratio to that between the corresponding points measured on the pelvis. This radiograph is taken as the "standard plate." By radiographing the patient in the same position as the "standard pelvis," an accurate comparison of the patient's plate with the "standard plate" will be obtained, and

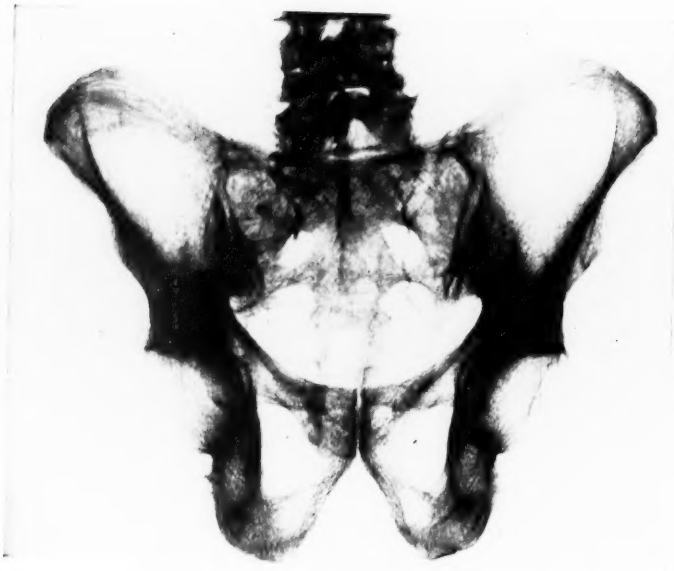

FIG. 5.—AN ABNORMAL PELVIS.

FIG. 6.—A NORMAL PELVIS.

therefore of the patient's pelvis with the "standard" or normal pelvis; from it the internal measurements can be mathematically worked out; when compared with the direct measurements they are fairly accurate, as is shown by Figs. 4 and 5, there being an error of 2 mm. only. To work out mathematically the transverse diameter, for example, of the pelvic inlet, the length of the transverse diameter of the pelvic radiograph of the patient is multiplied by the transverse diameter of the standard pelvis, and divided by the transverse diameter of the standard plate. In the same way the antero-posterior diameter of the inlet, or the transverse diameter of the outlet can be worked out. I have not mentioned the oblique diameters, but if the true conjugate is diminished the oblique will also necessarily be reduced in proportion.

Fig. 4 is a skiagram of a normal pelvis, which is taken as the "standard plate"; the dimensions are;—

	Pelvis: Direct Measurements.	Skiagram.
Inlet:		
Antero-posterior	11.5 cm.	13.5 cm.
Transverse	13.6 cm.	15.9 cm.
Outlet:		
Tranverse	11.0 cm.	12.0 cm.

Fig. 5 shows an abnormal pelvis, the internal measurements of which show a very slight diminution when worked out by the above method with the direct measurements, there being only an error of 3 mm. in the antero-posterior diameter of the inlet, 2.1 mm. in the transverse diameter of the inlet. It also shows clearly the diminution in the outlet.

	Pelvis.		
	Direct Measurements.	Worked out.	Skiagram.
Inlet:			
Antero-posterior ...	10.5 cm.	10.2 cm.	12.0 cm.
Transverse	12.0 cm.	11.79 cm.	13.7 cm.
Outlet:			
Transverse	7.5 cm.	7.5 cm.	8.2 cm.

Fig. 6 represents the pelvis of a healthy woman, aged 25 years, who has had three normal labours, and whose external measure-

ments are normal. The internal measurements have worked out very satisfactorily when compared with the standard plate.

	Standard.		Mrs. "A."	
	Pelvis.	Skiagram.	Pelvis.	Skiagram.
Inlet :				
Antero-posterior...	11.5 cm.	13.5 cm.	11.5 cm.	13.5 cm.
Transverse... ...	13.6 cm.	15.9 cm.	13.6 cm.	16.0 cm.
Outlet :				
Transverse... ...	11 cm.	12.0 cm.	11 cm.	12.2 cm.

Fig. 7 is a skiagram of a woman with a flat pelvis. This patient's first child was eviscerated, and her second was delivered by Cæsarean section. The transverse diameter of the inlet is normal, but the antero-posterior is diminished over an inch. The transverse diameter of the outlet is 1 cm. larger than normal.

	Standard.		Mrs. "B."	
	Pelvis.	Skiagram.	Pelvis.	Skiagram.
Inlet :				
Antero-posterior...	11.5 cm.	13.5 cm.	8.5 cm.	10.0 cm.
Transverse... ...	13.6 cm.	15.9 cm.	13.6 cm.	16.0 cm.
Outlet :				
Transverse... ...	11.0 cm.	12.0 cm.	12.19 cm.	13.5 cm.

Fig. 8. A skiagram of a woman with a generally contracted pelvis. The transverse diameter of the inlet is diminished 1 cm., and the antero-posterior is diminished 3 cm., or over an inch.

	Standard.		Mrs. " M."	
	Pelvis.	Skiagram.	Pelvis.	Skiagram.
Inlet :				
Antero-posterior...	11.5 cm.	13.5 cm.	8.6 cm.	10.1 cm.
Transverse... ...	13.6 cm.	15.9 cm.	12.8 cm.	15.0 cm.

The measurements of the last two cases were verified at the time of operation.

Pregnancy.

It is possible to obtain the X-ray shadow of the fœtus *in utero*, and this is a great clinical and medico-legal advantage in cases in which there is doubt as to the presence of pregnancy or the existence of an abnormality. It is possible to recognize the fœtus about the fourth month,—the use of the Potter-Bucky Diaphragm will enable us to recognize the presence of a pregnancy at even an earlier period.

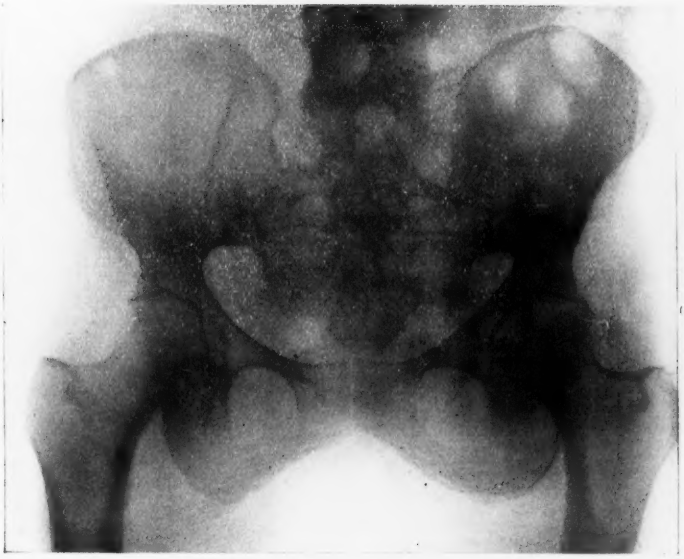

Fig. 7.—A Flat Pelvis.

Fig. 8.—A Generally Contracted Pelvis.

FIG. 9.—FŒTAL HEAD ABOUT TO ENGAGE THE PELVIS.

Photo taken five hours before the commencement of labour, which terminated normal.

FIG. 10.—FŒTAL HEAD ATTEMPTING TO ENGAGE A CONTRACTED PELVIS.

Showing moulding of the skull bones and overlapping by the fœtal skull of the pelvic inlet especially in the region of the symphysis pubis.

There are several factors which militate against the diagnosis of pregnancy in the early months,—the thickness of the maternal tissues, the hyper-congestion of the uterine wall, the amniotic fluid, and the slight density of the fœtal bones.

I am doubtful whether one will be able to differentiate between an extra-uterine and an intra-uterine gestation, unless we combine some clinical method while the photograph is being taken, such as bimanual examination, when the shadow produced by the doctor's fingers would denote the position of the uterus. If, however, the gestation was in the pouch of Douglas the fœtal shadow would overlap that of the doctor's fingers and make a differential diagnosis impossible.

Relations of the presenting part to the pelvis.

If the Röntgenograph is taken just before, or when labour commences, a very clear picture is produced of the fœtal position, and the relations of the presenting part to the maternal pelvis. In vertex presentations, when the head is about to engage in the pelvis, an accurate comparison between the fœtal skull and the pelvic inlet can be obtained, as is well illustrated by the following case (Skiagram No. 9). Mrs. S., aged 27, gave a history of a difficult instrumental delivery, the child living only an hour. Early in her second pregnancy she was sent to me. X-ray pelvimetry showed that her pelvis was normal. At the date of her confinement she was again X-rayed; this skigram showed that there was no moulding of the fœtal skull, and that the relations of the head to the pelvic inlet were satisfactory. The patient delivered herself nine hours later of a healthy child 7 lbs. in weight. Neither during the pregnancy or labour was a vaginal examination made.

If engagement of the fœtal skull is difficult, during the efforts of labour moulding of the bones can be clearly seen and one can judge by the amount of overlapping if delivery is possible. If engagement is impossible there is distinctly seen overlapping of the pelvic inlet by the fœtal skull, especially in the region of the symphysis pubis (Skiagram No. 10).

The recognition of this inability on the part of the fœtus to navigate the passages successfully, would spare, by a timely Cæsarean section, many a mother a difficult labour with extensive damage, and considerably reduce infant mortality.

Effects on the Mother and Fœtus.

While it is recognized that large doses of the X-rays will produce an artificial menopause, the short exposure which is required for obstetrical diagnosis has no deleterious effect on the mother, and does not produce a temporary sterility.

In none of my cases, when the X-ray exposure has occurred during pregnancy, has intra-uterine death been produced, nor has any physical or mental maldevelopment shown in the new-born child.

Conclusion.

In conclusion, I would like to emphasize the following :—

1. The necessity of a " standard " plate for pelvic measurements.

2. The patient must be radiographed in the same position as the " standard " pelvis, having the same point of focus, the X-ray tube at the same angle to and the same distance from the sensitive plate.

3. The accuracy of diagnosis in showing to advantage the variety of pelvic contraction, and the ease with which the various pelvic diameters can be worked out.

4. The minimum amount of discomfort to the patient compared with other methods of pelvimetry.

5. By the collaboration of the Röntgenologist and the obstetrician there exists a valuable means of conserving maternal and fœtal life.

To Dr. Beath, Röntgenologist to the Royal Victoria Hospital, Belfast, and to his assistant, Mr. Leeman, I express my gratitude for their assistance in taking the photographs for me.

Certain Observations on the Innervation of the Uterus.*

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and
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The problem of uterine innervation and the nervous mechanism controlling parturition is one which has for many years interested the physiologist, and one which is of considerable practical importance to the obstetrician.

Historical.

In introducing this further contribution to the subject, it is necessary to refer briefly to the work of other observers, a detailed resumé of which will be found in the very excellent and complete article contained in Marshall's recently published "Physiology of Reproduction."

As long ago as 1867 Kehrer noted that the uterus, when severed from all its attachments, underwent contractions if kept moist at the body temperature. This observation has since been confirmed by various other workers, including ourselves.

In 1871 Sir James Simpson found that parturition was normal in the case of sows from which he had removed the dorsal and lumbar cord, with the exception that the last fœtus of the litter in each case was not delivered. In the same year Riemann recorded an experiment in which a cat was delivered of a kitten after complete destruction of the spinal cord from the third dorsal vertebra downwards. These experiments, coupled with Amand Routh's observations on the course of labour in women suffering from paraplegia prove that an intact central nervous system is not *essential* for the uterus to complete its physiological function.

Belief in the existence of a so-called "lumbar centre" is, however, fairly general, based on the original experiments of Serres in 1824 and the more recent observations of Langley and Anderson in 1891 and 1895. Langley stated that the majority of efferent nerve fibres passed to the uterus "by way of the sympathetic in

* Read at the British Medical Association, Annual Meeting, Portsmouth, July 1923 (Obstetrical and Gynæcological Section).

the region of the fourth, fifth and sixth lumbar ganglia, and that stimulation of the second, third, fourth and fifth lumbar nerves in cats and rabbits causes pallor and contraction of the Fallopian tubes, uterus and vagina, but that stimulation of the first and sixth lumbar nerves produces no effect."

The recent work of Cushny, Fellner and Keiffer in 1906 and 1908, however, tends to prove that the problem is much more complex than appears on the surface. Cushny found that stimulation of the hypogastric nerve in the rabbit as a general rule produces powerful contraction whether the uterus is pregnant or not. Fellner, on the other hand, regards the hypogastric as being motor only to the circular muscle fibres of the corpus uteri and the longitudinal fibres of the cervix. It is inhibitory, in his opinion, to the longitudinal fibres of the corpus and the circular fibres of the cervix, which are controlled entirely by the "nervi erigentes." The existence of a complicated system of sympathetic ganglia and nerve trunks in the muscular wall of the uterus has been demonstrated by Keiffer,† of Brussels.

Our interest in the problem was stimulated by the observation noted by us in a previous communication of the extraordinary power of contraction possessed by the uterus in cases of Cæsarean section performed under lumbar spinal anæsthesia with tropacocaine. A detailed investigation, partly clinical and partly experimental, was instituted to ascertain if possible the cause of this increased tone and contraction of the uterine musculature. The research is still in progress, and the present paper simply records the observations noted to date, based on clinical work and animal experiment. The deductions can in no sense be regarded as final, and may require modification as the work proceeds.

No reference is made on this occasion to certain histological details, which we hope to bring forward at some subsequent date.

Clinical Results.

The clinical material upon which our observations are based is indicated in the subjoined table, and was selected to ascertain the character and nature of uterine contraction at various periods of pregnancy, when the nervous impulses from the lumbo-sacral cord were eliminated by means of spinal anæsthesia. The cases include :

† Since this paper was written a further communication has been published in this journel from the pen of Dr. H. Keiffer, of Brussels, under the heading of "The Anatomical Condition of the Wall of the Uterus of the Lesser Mammals at Term." This work dealing with the microscopical appearances of sections taken from the pregnant uterus at term and stained by the Ramon y Cajal silver method is of great scientific importance, and we desire to express here our appreciation of the same.—B.W. and H.F.

(*a*) Abdominal Cæsarean section, at the eighth and ninth month of gestation for such varying indications as contracted pelvis, placenta prævia, fibroids and toxæmia;

(*b*) Vaginal Cæsarean section during the fourth and fifth month of pregnancy; and

(*c*) Evacuation of the ovum at the second month of gestation.

The technique employed was practically the same in all cases, and is identical with that outlined by us in a previous communication. Briefly, it consists in the injection of 1.5 cc. of a 5 per cent. solution of tropa-cocaine (Allen and Hanbury) dissolved in normal saline solution into the spina theca, by means of a Barker's syringe introduced between the second and third lumbar vertebræ, after 10 cc. of cerebro-spinal fluid have escaped from the needle.

When the lumbar cord is paralyzed by the drug, usually in about five minutes, the uterus always contracts, and it does not relax until the drug ceases to act. This is the case whether a general narcotic, *e.g.*, nitrous oxide, ether or chloroform is administered or not. Further, the contraction appears to involve the circular muscle fibres of the uterus, the longitudinal being unaffected. In other words, the uterus grips the ovum firmly, and on several occasions before the abdominal incision was made the organ was noted to stand forward and to become markedly prominent.

When the membranes are incised and the liquor amnii has escaped, the uterus contracts down upon the fœtus with extraordinary rapidity, and may cause some difficulty in extraction. This is especially the case when the membranes have ruptured before operation, and, in the interest of the child, rapidity of technique is essential.

The lower uterine segment and cervix also appear to be involved in the increased uterine "tone." There is certainly no "polarity" as evidenced by dilatation, and in one instance (Case 3), some difficulty was experienced in extraction of the placenta *per vaginam*. Previous to operation in this case the degree of dilatation of the cervix appeared such as to warrant expulsion of the placenta *per vias naturales*. This in practice was rendered very difficult owing to the increased tone of the circular muscle fibres of the lower uterine segment. The uterus contracts equally well whether labour has started or not, and in our experience the tired organ, after 48 hours of expulsive effort, contracts quite powerfully when the lumbar stimuli are eliminated.

Further, we note that the contractile power is in no way diminished during the earlier months of pregnancy, as is shown by the two cases of vaginal Cæsarean section at the fourth and fifth

month of pregnancy, and the evacuation of the uterine contents at the second month.

On the other hand, contraction of the circular muscle fibres during pregnancy will not induce labour, as in the case of a patient from whom a large vaginal cyst was removed under lumbar anæsthesia during the fourth month of her pregnancy. The gestation in this case is proceeding normally to term.

The contractile power of the uterus under spinal anæsthesia is in marked contrast to what is generally observed when a general anæsthetic is administered. Under chloroform, ether, or nitrous oxide narcosis alone, however light or deep, the uterus when induced to contract by manipulation, or otherwise, generally relaxes somewhat after a few moments. This in our experience is never the case when the lumbo-sacral cord stimuli are eliminated, the contraction and " tone " persisting until such stimuli are restored.

With regard to the influence of spinal anæsthesia upon normal labour, we have been rather chary of experimentation owing to our direct observations of the behaviour of the uterus in cases of Cæsarean section.

As already noted, it appears to be the *circular* fibres of the uterine wall, both corpus and cervix, which are inhibited by the lumbo-sacral autonomic system, and for this reason we think that these stimuli should not be cut off until dilatation of the cervix is complete.

In one patient, a iii-para, to whom a spinal injection of tropacocaine was given when the os was fully dilated and the membranes ruptured, the second stage of labour occupied $1\frac{1}{2}$ hours. The *uterus never relaxed,* but, on the other hand, there were no very strong intermittent expulsive contractions. The child was expelled, painlessly, of course, by means of strong voluntary expulsive efforts on the part of the patient, reinforced by the hand of the medical attendant on the uterus. In other words, the child was partly *expressed* from the uterus. The placenta was delivered at the end of 15 minutes, and the lochia was less than normal. The necessity for expression of the child, due to loss of the normal expulsive mechanism under lumbar anæsthesia is important evidence, in our opinion, of tonic stimuli of the central nervous system normally exerted upon the *longitudinal* muscle fibres of the uterus.

With regard to operations on the non-pregnant uterus, no contraction of the uterine muscle was noted, and the only observation of interest related to the sensory impulses. When total abdominal hysterectomy was performed under spinal anæsthesia in the absence of adhesions to other organs, we found that it gave rise to very little, if any, shock. Should the organ, however, be

adherent to the small intestine considerable shock and discomfort of a vague type are produced. This appears to indicate that the autonomic *sensory* fibres from the uterus enter the spinal cord below the dorsal region, while sensory fibres from the ileum enter the dorsal region above the narcotized area.

Experimental evidence.

The experimental work in connexion with this investigation is being carried out in the Pathological Department of the University of Birmingham, with the kind assistance of Prof. Haswell Wilson and Dr. A. E. Wright, M.C., to whom we desire to express our indebtedness.

The results of certain animal experiments performed for us by Dr. Wright and independently confirmed by him are here recorded.

Experiment 1. Rabbit No. 1. Two weeks' pregnant.

Ether narcosis. Laparotomy and inspection of abdominal contents. Peristaltic movements of intestines well marked. No movements observed in pregnant uterus. Lumbar puncture performed in lumbar region. Peristaltic movements of intestines continued. Uterus unaffected. Tropa-cocaine ($2\frac{1}{2}$ per cent.) injected into lumbar spinal theca. Uterus immediately contracted. Spinal cord severed in upper lumbar region. Uterus contracted further and no subsequent relaxation noted. Dorsal region of cord pithed without relaxation of the uterus. Uterus excised and placed in bath of normal saline at temperature of 37° C. Rhythmical contraction and relaxation occurred for five minutes.

Experiment 2. Rabbit No. 2. Three weeks' pregnant.

Ether narcosis. Laparotomy and pregnant uterus containing seven embryos eviscerated into normal saline bath at temperature of 37° C. No movements of uterus noted until lumbar cord was narcotized, when permanent contraction occurred. This was increased by palpation, but did not relax completely. Injection of tropa-cocaine into dorsal region of cord produced no alteration in the uterine contraction. The dorsal cord was next pithed, without any change. The right broad ligament containing the uterine and ovarian vessels and nerves was then clamped and divided. The right uterus immediately commenced rhythmic contractions. The left uterus remained tonically contracted. The uterus was finally excised and placed in a warm saline bath. Peristaltic waves of contraction apparently commencing in the region of each Fallopian tube continued for several minutes.

Experiment 3. Rabbit No. 3. Three weeks' pregnant.

Ether narcosis. Laparotomy. Intestines and uterus containing five embryos eviscerated and placed in warm saline. Lumbar cord pithed, followed by tonic contraction of uterus. Dorsal cord pithed without alteration in condition of uterus muscle. Mesentery divided without effect on uterus. All tissues divided at junction of lumbar and dorsal region, with the exception of the abdominal aorta and inferior vena cava. The uterus did not relax. The uterus was excised and placed in saline. The temperature of the latter had fallen to 30° C., and no peristaltic movements were observed. The temperature of the bath was raised to 37° C., when rhythmic contraction and relaxation of the excised organ commenced.

Experiment 4. Rabbit No. 4. Four weeks' pregnant.

Ether narcosis. Laparotomy. Hypogastric nerve exposed and stimulated by Faradic current. This produced contraction of the circular fibres of the uterus, the portion of the organ containing each fœtus becoming pale and the transverse diameter being diminished. The portion of the uterus intervening between the various fœtuses did not diminish and no contraction of the longitudinal fibres was observed.

The lumbo-sacral cord was next exposed, and the Faradic current applied to the same, and to the third and fourth lumbar nerves at the point where they left the cord. Stimulation, both of the lumbar cord and of the third and fourth lumbar nerves, produced marked contraction of the uterus and vagina, the contraction apparently involving the longitudinal fibres only. A longitudinal band, extending along the convex surface of the uterus and opposite to the mesometrium, became very evident by reason of its pallor, and resembled one of the tænia of the colon. The uterus diminished in length from the Fallopian tube to the vagina. No contraction of the circular fibres, however, was evident, as shown by any diminution in the transverse diameter of the uterus at the seat of each embryonic attachment.

The observations recorded in the foregoing experiments may briefly be annotated as follows:—

1. When the lumbar cord of a rabbit is narcotized the pregnant uterus passes into tonic contraction, the contraction apparently involving the circular muscle fibres only.
2. When the spinal cord of the same animal is divided in the dorso-lumbar region, and the lumbar cord is pithed, the tonic contraction persists.

3. When the dorsal cord of the same animal is pithed the uterus remains in a condition of systole.
4. When one cornu of the uterus in the same animal is isolated by section of the vessels and nerves in the mesometrium, this cornu relaxes and exhibits rhythmical peristaltic movements. The other cornu, with undivided mesometrium, as a control, remains contracted.
5. Transverse section of a pithed rabbit at the brim of the pelvis, and division of all the structures supplying the uterus at this level, with the exception of the aorta and inferior vena cava, do not affect the continuity of the uterine contractions.
6. The excised uterus placed in warm saline solution continues to contract rhythmically in peristaltic waves for some minutes. Each wave apparently commences at the Fallopian tube and passes towards the vagina.
7. Stimulation of the lumbar cord and certain lumbar nerves produces contraction of the pregnant uterus and the vagina, but the contraction involves the longitudinal muscle fibres only.
8. Stimulation of the hypogastric nerve in the rabbit produces contraction of the pregnant uterus, but the contraction involves the circular muscle fibres only.

These facts, which in part confirm and in part differ from the results noted by other workers, are of interest when taken in conjunction with the clinical details already noted. Other observers have relied almost entirely upon laboratory experiments for their results. In this investigation, with the aid of spinal narcosis, we have the advantage of checking animal experiment by direct observation upon the human uterus and *vice versa*.

Again, most writers, with the exception of Fellner and Cushny, have been content to regard the uterus as a whole, and to observe the effect of stimulation of various nerves on the organ without reference to the individual muscle bundles involved. We regard this as a most important aspect of the problem. Fellner, to whose work we have already referred, regarded the hypogastric nerves as "motor" for the circular bundles of the corpus uteri, and the longitudinal bundles of the cervix, but "inhibitory" for the longitudinal muscles of the corpus and the circular muscles of the cervix. The lumbar cord, viâ the *nervi erigentes*, is, in his opinion, motor for the longitudinal muscles of the corpus and the circular muscles of the cervix, but inhibitory for the circular bundles of the corpus and the longitudinal bundles of the cervix. This is shown diagrammatically in Fig. 1.

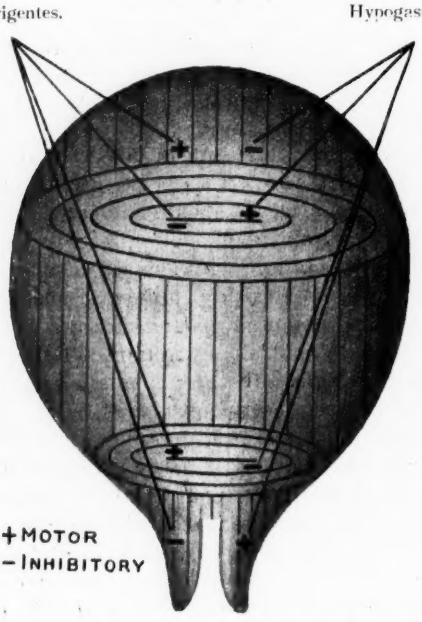
Our work confirms Fellner's views with regard to the corpus

uteri, but, from our experiments and observations to date, we differ from him on the question of the lower uterine segment and the cervix. We think that the circular fibres of the uterus, both in corpus and cervix, are stimulated by the sympathetic system and inhibited by the lumbar cord. The longitudinal fibres, on the other hand, both corporeal and cervical, also the longitudinal muscle in the vagina in the case of the rabbit, appear to us to be stimulated by lumbar cord impulses, and inhibited by the sympathetic. (Fig. 2.)

In other words, local paralysis of the lumbar cord, whether permanently by trauma or temporarily by spinal narcosis, produces marked contraction of the circular muscle fibres of the uterus as a whole, owing to uncontrolled sympathetic impulses, but the expulsive power is lost owing to paralysis of the longitudinal fibres.

FIG. 1.

SCHEMATIC ILLUSTRATION OF UTERINE INNERVATION.
Fellner (1906).

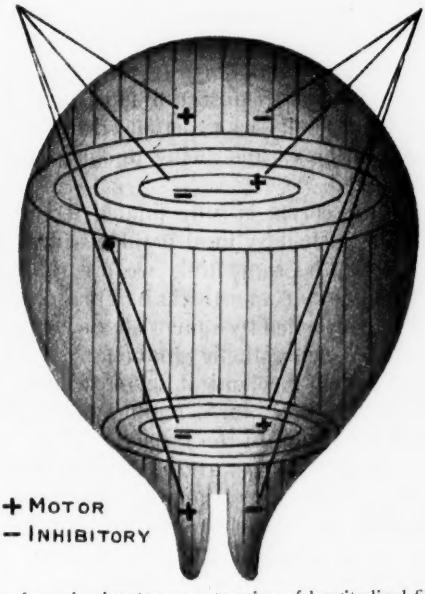


Stimulation of	nervi erigentes	=	contraction of	longitudinal fibres	corpus.
„	„	„	„	=	„	„ circular	„ cervix.
Paralysis	„	„	„	=	„	„ circular	„ corpus.
„	„	„	„	=	„	„ longitudinal	„ cervix.
Stimulation of	hypogastric	=	„	„ circular	„ corpus.
„	„	„	=	„	„ longitudinal	„ cervix.

Similarly, weak or absent sympathetic impulses produce over-action of the longitudinal fibres and increased expulsive efforts. The *tone* of the uterus as a whole, however, is lost and the organ is "flabby" owing to paralysis of the circular fibres. There is a good deal of evidence, both experimental and clinical, which directly tends to confirm these suggestions. To refer once more to Sir James Simpson's observations in the case of sows from which he removed the spinal cord before parturition. He observes that "the uterine contractions were sufficient to expel the fœtuses from the uterus, and each fœtus as it came into the vagina was thence extruded by the force transmitted from the fœtus behind it; but when the last fœtus came into the vagina it remained there, because there was nothing to transmit the uterine expulsive force." This interesting observation is probably explained by the fact that the

FIG. 2.

SCHEMATIC ILLUSTRATION OF UTERINE INNERVATION.
Whitehouse and Featherstone (1923).



Stimulation	of	nervi erigentes	=	contraction	of longitudinal fibres	corpus.
„	„	„ „	=	„	„ longitudinal „	cervix.
Paralysis	„	„ „	=	„	„ circular „	corpus.
„	„	„ „	=	„	„ circular „	cervix.
Stimulation	of	hypogastric	=	„	„ circular „	corpus.
„	„	„	=	„	„ circular „	cervix.

circular muscle fibres with the mechanical advantage were sufficient to expel all the fœtuses but the last. The last could not be expelled because the mechanical advantage was lost and the longitudinal expelling fibres of the uterus were paralyzed.

Brachet, quoted by Amand Routh, records the only case in which a spinal lesion actually involved the lumbar cord. In this patient the uterus contracted, *but the contractions were not sufficient to expel the child* which had to be extracted by forceps. The placenta was also removed by hand. In Routh's case the lesion was not in the lumbar cord and the lumbar influences cannot be regarded as being eliminated.

With regard to the influences of lumbar anæsthesia on the course of normal labour our observation is interesting, since with the patient on whom it was tried, a multipara with a fully dilated cervix, the second stage of labour occupied $1\frac{1}{2}$ hours. Further, the delivery was aided by pressure upon the uterus from the abdomen. Nevertheless, the uterus appeared to be firmly contracted the whole time, and subsequently the amount of hæmorrhage after separation of the placenta was less than normal. In other words, it was the *expulsive power* of the uterus which was diminished by lumbar anæsthesia.

Contraction of the circular fibres of the lower uterine segment is very evident when a Cæsarean section is performed under lumbar anæsthesia, and the difficulty we experienced in one case in delivering the placenta into the vagina owing to contraction of the cervix has already been noted.

Probably once the cervix is fully dilated the contractile power of the muscle is diminished by local paralysis from pressure of the presenting part. At the same time we are of opinion that the administration of a lumbar anæsthetic before full dilatation of the cervix is a procedure attended by some risk, owing to the possibility of contraction from sympathetic influences. Any subsequent dilatation must be purely mechanical, owing to the paralysis of the longitudinal or " taking up " fibres, and may be attended by severe hæmorrhage from laceration of the tissues.

The mechanism involved in the normal "systole" and "diastole" of the uterus has still to be investigated. As we, in common with other observers, have shown, the uterus when severed from all its connexions undergoes rhythmical contraction and relaxation as long as it is maintained at a normal temperature. It also responds immediately to various stimuli directly applied, *e.g.*, tactile, heat, faradism, etc., behaving in this respect identically with other organs composed of involuntary muscle. Keiffer's work upon the uterine ganglia and the uterine musculature has thrown light upon the problem, but many points still remain obscure.

The present position may in general terms be summarized as follows:—

1. The nervous mechanism controlling the uterus is constituted by three systems: (*a*) Local; (*b*) sympathetic; (*c*) lumbo-sacral autonomic.
2. The "local" is capable of producing rhythmical uterine contractions, and is independent of the sympathetic and autonomic systems, in common with other involuntary muscle.
3. The sympathetic stimuli are motor to the circular muscle fibres and inhibitory to the longitudinal bundles.
4. The lumbar cord stimuli are motor to the longitudinal fibres and inhibitory to the circular ditto.
5. Both autonomic and sympathetic stimuli are controlled by higher centres in the medulla and possibly the cortex, but are capable of acting independently of the same.
6. Reflexes, both (*a*) autonomic, and (*b*) sympathetic, are probably important factors in normal uterine contraction (cf. mammary and perineal stimulation).
7. Uterine contractions, to be effective, depend equally upon the integrity and correctly adjusted balance of autonomic and sympathetic impulses. Disturbances in either, whether in the direction of augmentation or diminution, will interfere with the normal course of parturition.

Practical Application of Results.

In conclusion, we cite a few instances in which the observations here recorded may possibly find a practical application.

In the first place, in classical Cæsarean section, the advantages of lumbar narcosis, either alone or combined with a general anæsthetic are evident. By elimination of inhibitory stimuli from the lumbar cord and allowing the hypogastric impulses full play, the circular muscle fibres of the uterus contract firmly, and in so doing reduce hæmorrhage to a negligible amount. In one of our cases (Case 11) the fœtus and five fibroids were removed at term with only a trifling amount of bleeding. The contraction of the circular fibres also produces more marked eversion of the edges of the uterine incision than is normally present, and consequently the introduction of the uterine sutures and accurate coaptation of the cut surfaces is facilitated.

Secondly, in cases in which a temporary increase of intrauterine tension is indicated, as in ante-partum hæmorrhage from premature

separation of a normally situated placenta, it is possible that this may be obtained without risk of inducing labour by means of lumbar cocainization.

With placenta prævia, on the other hand, although the hæmorrhage might be controlled for the time being by contraction of the lower uterine segment, it is probable that subsequently it would be increased, owing to greater separation of the placenta.

Thirdly, when the uterus is exhausted, we are of opinion that spinal anæsthesia will undoubtedly diminish the tendency to post-partum hæmorrhage. It certainly, in those cases which we have observed, diminishes the amount of bleeding from the placental site.

For the same reason we prefer spinal to general anæsthesia when it is necessary to evacuate the uterus by the vaginal route during the earlier months of pregnancy.

Tonic uterine contraction during labour, either general or local, as in the "contraction ring" and so-called "rigid cervix," we believe to be due to excessive sympathetic stimulation.

Some cases of intrinsic dysmenorrhœa possibly have a similar etiology, for after all, each menstrual period is a miniature labour.

Finally, we repeat a note of warning in connexion with the employment of spinal anæsthesia in normal cases of labour. By its use dilatation of the cervix will be delayed, and even if administered at the commencement of the "second" stage, the expulsive power of the uterus is diminished. Consequently forceps delivery, with its attendant risks, will in all probability be required.

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TABLE I.

Table showing the effects upon the uterus of paralysis of the lumbar cord with tropa-cocaine.

Case	Ref.	Operation	Indication	Period of Pregnancy	In Labour	Uterus	Child	Remarks
1	51	Cæsarean section	Contracted pelvis	Term	48 hours	Contracted well	Rather cyanosed	Uterine contraction involved circular fibres only. Both upper and lower uterine segments involved.
2	66	„	„	„	No	„	Not cyanosed	Uterine contraction very marked. Severe post-operative pain commencing two hours after operation.
3	73	„	„	„	48 hours	„ Cervix rigid	Cyanosed. Pressure on R. parietal bone	Nitrous oxide anæsthesia in addition to spinal tropa-cocaine. Rigidity of cervix caused some difficulty with expulsion of placenta into vagina.
4	74	„	„	„	No	Contracted well	Not cyanosed	Very little post-operative pain. Peristalsis of small intestine well marked.
5	53	„	„	„	48 hours	„	„	No post-operative pain.
6	29	„	Diabetes	8th month	No	„	„	Some post-operative pain. Contraction of circular muscle fibres very evident.
7	41	„	Placenta prævia	„	„	„	„	Lochia more severe.
8	57	„	Placenta prævia Binovular twins	„	„	„	1 child survived 1 „ „ 5 hrs.	Some difficulty in extracting second child owing to contraction of uterus, which was very marked.
9	64	„	Placenta prævia Epilepsy	„	„	„	Not cyanosed	Epileptic convulsion immediately after spinal injection of tropa-cocaine. No " after-pains."
10	62	„	Toxæmia Convulsions	„	„	„	Survived 7 days	Primigravida. No " after pains." Recovery normal.
11	60	„ Myomectomy	Fibroids and Pregnancy	Term	„	„	Not cyanosed	Uterine contraction very well marked. Five fibroids removed and uterus sutured. Hæmorrhage very slight. No " after pains."
12	63	Cæsarean section Sub-total hysterectomy	Concealed accidental hæmorrhage	„	„	„	Still-born	Uterine wall much infiltrated with blood. Sub-peritoneal hæmorrhages well marked.
13	70	Vaginal Cæsarean section	Tuberculosis	4th month	„	„	—	Very little uterine hæmorrhage. Uterus contracted immediately and remained contracted.
14	71	„	Placenta prævia	5th month	„	„	—	Uterus contracted well. No stimulation required. Hæmorrhage very slight.
15		Evacuation of uterus	Mitral stenosis	2nd month	„	„	—	Uterus strongly contracted. Hæmorrhage negligible.

On Bacillus Coli Infections of the Urinary Tract with special reference to the Presence of Similar Organisms in the Fæces.

By Frank Bawtree, M.R.C.S., L.R.C.P.,
From the Department of Pathology, St. Thomas's Hospital.

This investigation was undertaken with the view of obtaining evidence of the origin of the infection of the urinary tract with bacillus coli, and of any specific relationship between these organisms and those isolated from the fæces of each case.

A very large amount of work has been done on this subject by various investigators, but no clear evidence has been obtained as to whether the infection of the urine takes place *via* the blood stream or is due to direct infection through the lymphatics or by external means. Many have thought that contamination by fæces of the external parts, especially in women, might be the cause of these infections, and the cases included in this series have been examined with this possibility in view.

Herrold[3] published in June, 1922, the results of the examination of eight selected cases of pyelonephritis in women. This work was based on the work done by Dudgeon[1] and his co-workers and published in October, 1921. The object of the investigation was to correlate the strains of bacillus coli isolated from the urine, with the strains of bacillus coli obtained from the fæces and cervix uteri by means of serological and biological methods.

Monovalent sera were made by immunizing rabbits with killed cultures of the urinary strain. Five of these strains were hæmolytic and three non-hæmolytic.

The results of the agglutination tests with these sera were as follows:—

In the five hæmolytic cases similar hæmolytic strains of coli were obtained from the fæces, or cervix uteri (in one case from both sources). These strains were agglutinated by the monovalent serum to the same titre as the urinary strain in each case; one non-hæmolytic strain was obtained from the cervix uteri, which similarly was agglutinated by the monovalent urinary serum. In the remaining two non-hæmolytic cases no colon bacilli were found in the fæces or cervix uteri which corresponded with the agglutination reactions of the urinary strain.

Three of the hæmolytic urinary sera cross-agglutinated with

each other, the remaining five—two hæmolytic and three non-hæmolytic—agglutinated only the homologous antigens.

Herrold found that the cultural properties of hæmolytic and non-hæmolytic coli were of little use in grouping the various strains. He also came to the conclusion that hæmolytic colon bacilli in renal infections are more often present than is generally recognized, and that this type has a greater average of virulence than the non-hæmolytic, but that the latter appears to persist longer.

By using monovalent sera Herrold was able to demonstrate the presence of organisms in the fæces which were agglutinable with the anti-serum made from the urinary strains. It is probable that if this method had been employed in the present series the proportion of cases with similar organisms in the urine and fæces would have been greater.

Thomson[4], in a paper read before the Royal Medical and Chirurgical Society in Glasgow, in 1921, on Coli infection in seventy-four children under two years old, states that it seems certain that the colon bacilli in these infections generally come from the patient's own bowel, but that for this to occur some predisposing cause must be present such as (1) the lowering of the resistance of the tissues due to some local or general disease; (2) the retardation of the flow of urine; and (3) some condition in the intestine which has led to an increase in the virulence of the micro-organisms themselves. In relation to this last-mentioned cause, chronic constipation has been considered by some as a possible predisposing cause of infection of the urinary tract, and each case in this series has been questioned with regard to this. The number of cases is, however, too small for any opinion to be expressed on this point. On the other hand, as Thomson points out, many cases of acute pyelitis start suddenly during an attack of severe diarrhœa; the close relationship of the colon to the right kidney may have some connexion with this sudden onset in these cases.

The methods employed in the present investigation are based on the work done in these laboratories during the last two years, and already published.[1 2]

In this work the various strains of bacillus coli obtained from infections of the urinary tract were grouped by their hæmolytic or non-hæmolytic properties and by their serological reactions; the cultural properties were then, as now, found to be of little value for grouping.

Six of the coli anti-sera standardized by Dudgeon and his co-workers were used in the present investigation, and are fully described in the papers referred to.

The procedure in each case was to examine a catheter specimen

of the urine by the ordinary routine method, and if colon bacilli were found present their hæmolytic properties and cultural characters were ascertained. An antigen was made by the ten sub-culture method in veal broth and its serological reaction examined with the coli anti-sera.

The fæces in every case were examined on one or more occasions and tested by the method described in a later section for the presence of organisms similar in properties to the organisms isolated from the urine.

The patient's serum was also examined at the same time for coli agglutinins.

Many of the strains of bacillus coli obtained from the urine were inagglutinable by the methods employed. In such cases the chief indicator for similar organisms in the fæces was wanting, and until this difficulty is overcome the number of instances in which organisms similar in serological and hæmolytic properties can be found in the urine and fæces is likely to be small.

In five cases in this series organisms with similar serological reactions were isolated from the urine and fæces. Further reference is made to these cases later.

All the strains of bacillus coli examined in this series produced acid and gas in lactose, dextrose, maltose, and mannitol, acidified and clotted milk and formed indol; the strains varied in their actions on cane sugar and dulcitol.

Urine.

Of the 30 cases in this series, 23 were female and seven male; hæmolytic strains of the bacillus coli were isolated from ten of the female cases (44 per cent.) and three of the male (45 per cent.).

Hæmolysis.

The medium employed for ascertaining the hæmolytic properties was 1 per cent. peptone in distilled water, containing 0.5 per cent. and 0.85 per cent. sodium chloride, and the method was the same as that described by Dudgeon.[1] In all the hæmolytic strains included in this series hæmolysis was present in both stages of the test; in no instance was a hæmolytic and non-hæmolytic strain of bacillus coli isolated from the same case, and when subsequent examinations of the urine were made, the hæmolytic or non-hæmolytic properties were found to be constant.

Agglutination.

For ascertaining the serological reactions one or more colonies in each case were sub-cultured in veal broth and then examined with the coli-anti-sera at 52° C. for five hours. This period of time

was found by experience to be sufficient, and in fact most of the information required can be obtained at the end of three hours. The readings are taken half an hour after the removal of the tubes from the water baths.

Of the cases in this series, 14 were agglutinable and 16 inagglutinable by this method. In a few inagglutinable cases ten-subcultures on agar were used in addition, but no better results were obtained.

Cultural Properties.

For the solid media litmus was used as an indicator, and for the liquid media phenol red. The advantages of phenol red over litmus are due to its sensitivity to slight alterations from neutral point to acidity or alkalinity, and the additional indication on the alkaline side. As previously mentioned no great reliance can be placed on the cultural properties alone in grouping the various strains of bacillus coli; some (six) of the urinary and fæcal strains obtained from the same case did possess similar cultural properties but these were with one exception inagglutinable by the methods employed.

FÆCES.

Dudgeon's method, as described by Wordley[5], was employed for examining the fæces in every case.

At the commencement of this investigation one or more colonies were taken and examined for cultural and hæmolytic properties and serological reactions, in the same way as described for the urinary strains. At a later stage in the enquiry, when it was found that strains of bacillus coli exactly similar in serological reactions to those isolated from the urine were to be found in the fæces, different methods were adopted. In many instances eight or ten colonies were sub-cultured from the plates into broth and these sub-cultured daily for two or three days. They were then examined by the addition of the anti-sera which had been found to agglutinate the urinary strain. The tubes containing the broth culture and the anti-serum were placed in a water bath at 55° C. for three hours, and if agglutination occurred, these colonies were taken for fuller examination. By these means it was hoped that the number of cases in which similarity in urinary and fæcal strains could be found would be increased, and in some instances in which this method was adopted this was found to be so. Case 16 is a good example of this; the urinary strain was strongly agglutinable with one non-hæmolytic serum; several colonies of the fæcal strain were tested with this anti-serum as described above, and one-half of the colonies so examined were found to be agglutinable by this method, and also by the five-hours' method, the agglutination titre being the same as that of the urinary strain.

In some cases in which there was identity between the urinary and fæcal strains, only one colony from the fæces was examined for serological reaction, so that it may be assumed that the urinary bacillus was in these instances present in large numbers in the fæces.

Hæmolysis.

The hæmolytic properties of the fæcal strains in every case were examined by means of human blood agar plates and also in many instances by the liquid media as already described. In two instances only were hæmolytic coli present, and these were both female cases and both strains were inagglutinable.

Agglutination.

Twenty-four of the thirty cases were examined as to their serological reactions, and nine of these were agglutinable, eight being female cases and one male.

Cultural Properties.

The cultural properties of every strain isolated from the fæces were examined, but no assistance was obtained by this method; in many instances strains possessing similar serological reactions differed in their cultural properties.

Coli Agglutinins in Human Sera.

Dudgeon[1, 2] and his co-workers examined the sera of 56 cases of proved coli infection : a dilution of 1 in 50 was taken as indicating a positive result with the antigens employed; 32 of these sera contained coli agglutinins. Forty-four cases of enterica and chronic diarrhœa similarly examined gave 26 positive results.

Twelve special cases of pregnancy and the puerperium gave nine positive results although a coli infection had not been proved.

The same workers also examined the sera of 170 cases sent to the laboratory for other purposes and believed to be free from a coli infection; 27 of these sera contained coli agglutinins.

These results show that the sera of proved cases of coli infection give a much higher percentage (57.1) of positives than the sera of "normal" individuals (15.8 per cent.), but, as Dudgeon and his co-workers observe, there is difficulty in fixing the limit of the coli agglutinin content in the human subject, a difficulty which is increased by the impossibility of accurately excluding a coli infection.

The series of 12 special cases quoted above is of interest as although a coli infection was not proved nine of the sera gave

positive results; this shows that many cases of acute coli fever of pregnancy may be of much longer standing than is often suspected. Among the cases mentioned in the papers above referred to, many instances of acute coli fever of pregnancy which were believed to be due to a recent infection were subsequently found to have had a long-standing bacilluria.

The blood serum of each of the 30 cases in this series was examined for coli agglutinins, and in 19 instances they were found to be present in a greater or lesser degree; the maximum agglutination titre was 1 in 1500; in the majority it varied from 1 in 50 to 1 in 400.

In five of these 19 cases neither the urinary nor fæcal strains were agglutinable with the coli anti-sera. In the remaining 14 cases the serum of the patient contained agglutinins for one or more of the coli-antigens, the homologous sera of which agglutinated either the urinary or fæcal strain.

Six coli antigens were employed for the examination of the sera, three hæmolytic and three non-hæmolytic, and also in some instances the antigens made from the urinary and fæcal strains of the cases. In seven instances there was a reaction with both hæmolytic and non-hæmolytic antigens, but it was found that the serum reacted most markedly with the hæmolytic antigen in the cases in which the urinary strain was hæmolytic, and with the non-hæmolytic antigen when the urinary strain was non-hæmolytic. In four cases in which the urinary strain was hæmolytic, the serum contained agglutinins for the hæmolytic antigen only, and similarly in three cases in which the urinary strain was non-hæmolytic the serum agglutinated the non-hæmolytic antigen only. In the remaining five cases the sera reacted with antigens that did not correspond in hæmolytic properties with the urinary strain.

Several cases were treated with vaccine, and the sera re-examined after treatment; the coli agglutinins were found to be increased, although not in a very marked degree.

In a few instances the sera were examined for precipitin reaction, the method employed being that described by Dudgeon[2] and his co-workers, and the results obtained corresponded in every instance with the agglutination reaction.

Notes and Conclusions.

The two most interesting cases of this series are Nos. 1 and 12. They were both female and gave a very similar history. In each case the agglutination titre of the urinary and fæcal strains were almost exactly similar, and the coli anti-sera with which agglutination occurred were the same.

Two rabbits were immunized with live cultures of the fæcal strain of each case, and the resulting sera agglutinated both the urinary and fæcal strains, and also cross-agglutinated with the urinary strains. The rabbit serum of Case No. 12 was saturated with thick emulsions of the bacillus from the urine and fæces with the following result:—

The serum saturated with the fæcal strain lost all agglutinins for the fæcal and urinary antigens; the serum saturated with the urinary strain lost all its agglutinins for the urinary antigen and those for the fæcal antigen were very greatly reduced; the control serum agglutinated with both antigens to full titre.

The next case which showed similarity between the organisms found in the urine and fæces is No. 4. This was also a female and the bacillus from the urine was hæmolytic, but contrary to the usual findings was inagglutinable with the Dow and 5651 anti-sera. It was, however, strongly agglutinable with the non-hæmolytic anti-serum 4869. The fæcal strain which was non-hæmolytic was also agglutinable only with the 4869 anti-serum. The serum of the patient agglutinated the urinary and fæcal antigens (1 in 100) and also the 4869 and Dow antigens (1 in 50).

Case 16 was an elderly female who had been in Hospital six months previously suffering from coli infection of the urinary tract. The serological reactions of the urinary strain obtained on that occasion and the fæcal strain isolated when the patient was re-admitted to Hospital, were closely related; the hæmolytic properties were, however, distinct in that the urinary bacillus was hæmolytic and the fæcal bacillus non-hæmolytic; the urinary strain isolated on the second occasion—although similar in hæmolytic and cultural properties—was inagglutinable.

This patient was treated with vaccine and mercurochrome bladder washes with marked success.

Case 28 also showed similarity of serological reactions between the urinary and fæcal strains, both being agglutinable with the same two coli-anti-sera.

This proportion of five cases out of 30, in which similarity between the organisms obtained from the urine and fæces as shown by serological reactions is evidence in favour of this origin of infection, especially as they are all female.

It is also of interest to note that thirteen of the twenty-three female cases were either pregnant or had very recently been confined.

My thanks are due to Professor Dudgeon for much kind help and advice, and also to Drs. Bamforth and J. F. Taylor for assistance in collecting material.

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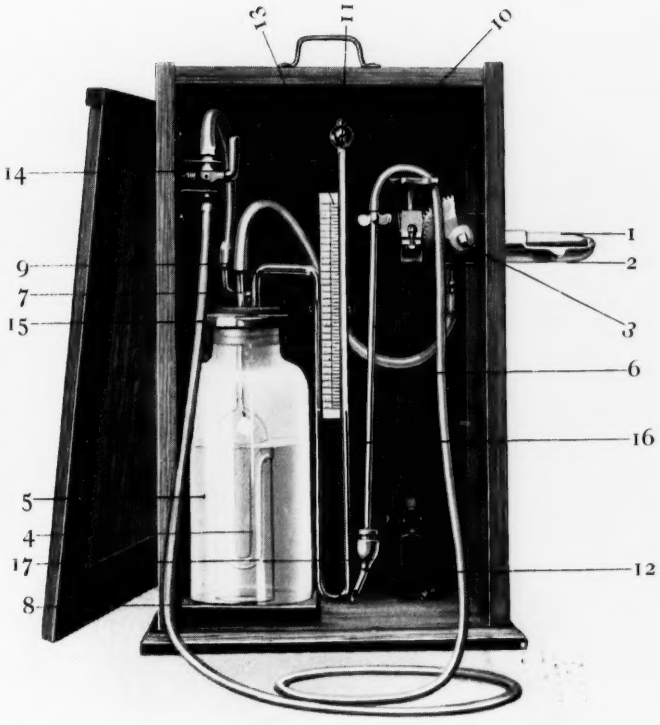
A New Method of Determining the Patency of the Fallopian Tubes in cases of Sterility due to their Obstruction.

By GILMAN S. CURRIER, M.D., New York.

WHEN both Fallopian tubes are impermeable to gas they render impossible the ascent of spermatozoa or the descent of ova, a definite and frequent cause of sterility in women. Knowledge of this condition of patency is of great value, not only for diagnosis but also to determine the course of future treatment, whether it be by operation, by tamponade or by some other method, depending on the nature of the occlusion (velamentous, etc.) to restore the patency. The apparatus I have devised to test the patency of the Fallopian tubes is compact, reliable and simple, and can be used just as easily in the home of the patient and in the consulting room of the doctor, as in the out-patient and in-patient departments of a hospital.

The outfit is encased in a wooden box with a removable front. A "sparklet" tank (1) of carbon dioxide (used for carbonizing water in bottles) is the source of the gas. This small tank contains eight cubic centimetres of gas in liquid form at a pressure of about 1,000 lbs. per square inch, and is surrounded by a shell (2) which, when screwed down, fits the shoulder tightly against a rubber washer, and forces one end of the tank against a hollow needle which perforates it, thus releasing the gas. The escape of gas from the "sparklet," after this has been perforated, is controlled by a delicate valve (3). By an appropriate movement of the valve the gas can be released from the "sparklet," and is then conveyed to a glass bell (4), which is contained in a wide-mouthed quart bottle (5); the gas passing from the "sparklet" to the glass bell through an india-rubber tube (6), which has one of its ends attached to the valve and the other to a glass tube (7), which perforates the india-rubber stopper of the quart bottle and is continuous with the glass bell. Inside this glass bell is a syphon (8), the purpose of which is to empty the gas when the bell is full of carbon dioxide, indicating each time that it is emptied that 50 cubic centimetres have escaped into the bottle. By this means one notes that the gas is flowing. The bottle contains enough ordinary tap-water to cover the opening of the syphon.

* The apparatus was demonstrated at the meeting of the British Medical Association, July 25, 1923.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From the bottle the gas passes through a glass Y-shaped tube (9) in the second hole of the rubber stopper. One arm of this Y-tube leads into a U-shaped glass tube containing mercury (10), and the free end of this tube is " thistle " shaped (11), enabling one to pour in the mercury which is carried in a bottle (12). There is a millimetre scale (13) between the two columns of mercury, which, being movable, enables it to be set at zero regardless of the amount of mercury in the U-shaped tube. The other arm of the Y-tube leads to a three-way stop-cock (14) by rubber tubing. From this stop-cock another rubber tube (15) leads to a flexible hollow tin sound (16) of gauge 15; the end of which can be bent to suit the cavity of the uterus. Near the end of the hollow sound is a rubber acorn (17) which, by fitting closely against the cervix, prevents the escape of gas, except through the Fallopian tubes, when the sound is introduced into the uterus and the gas allowed to flow.

Method of using the apparatus.

The apparatus is used as follows:—The " sparklet " is introduced into the shell, and with the valve closed the shell is screwed down as far as possible, pressing the cylinder shoulder against the rubber washer and simultaneously perforating the sealed end of the " sparklet " by the hollow needle, thus freeing the gas.

Water is put in the wide-mouthed bottle to the level of the syphon-opening and mercury poured into the manometer. The india-rubber stopper of the glass bottle must be pushed well in or the pressure of the gas will blow it out. The flow of gas is so regulated by the valve that with the escape of gas to the outward air shut off by the three-way stop-cock the pressure, as shown by the mercury manometer does not rise too rapidly. Arbitrarily, a rise of 5 millimetres of mercury per second is a good standard, which, once attained, is allowed to continue until the test is finished, although it is perfectly practicable to alter the rate of flow of the gas during the test on account of the extremely delicate adjustments of the valve.

The stop-cock can be turned in three positions—(i) allowing gas to escape to the open air through the hole on the side; (ii) closing off all exit of gas, thus raising the column of mercury; (iii) directing the gas through the metal sound into the uterus. After adjustment the stop-cock is left in position (i) until the doctor is ready to apply the test, since the mercury may be blown out of the tube if the pressure is allowed to rise above the limit of the scale.

Inasmuch as the hollow tin sound introduced into the uterus must be sterile, surgical technique must be followed. This does not mean that the patient need be shaved, and the operator need

not wear a sterilized gown or gloves if he does not touch that part of the sound entering the uterus with his hands.

The vagina and cervix are thoroughly swabbed with tincture of iodine, after which a sterile bivalve speculum is inserted into the vagina. The cervix is then grasped transversely with a sterile single-toothed tenaculum or bullet forceps, in order that the instrument may not interpose between the cervix and the rubber acorn and so allow the escape of gas. Before sterilization the sound is bent to suit the axis of the uterine cavity, and the rubber acorn is fixed 1 to 1½ inches from the tip, depending on the size of the cervix and length of the uterus as estimated by digital examination *per vaginam*. The sound is now introduced into the cavity of the uterus till there is firm coaptation between the rubber acorn collar and the cervix, which is secured by pressure on the sound and traction on the tenaculum, and if the coaptation is correct gas, when allowed to flow, should not escape. Should there, however, be a leakage the rubber acorn must be more firmly pressed against the cervix, and this will usually be necessary if the cervix is badly lacerated.

Injection of novocaine into the cervix may occasionally be necessary, when the tenaculum is applied, as in some patients the cervix is more tender than in others, but this can usually be dispensed with. On the other hand, general anæsthesia, if necessary, can be used, as it is not necessary to rely on any subjective symptoms on the part of the patient.

When the rubber acorn on the sound is not firmly pressed against the cervix the escape of gas can be detected by a gurgling due to the gas mixing with the secretion of the cervix and a sense of vibration felt through the metal sound and tenaculum and an irregular and unsteady drop in the column of mercury.

When the stop-cock is turned so that gas is directed into the uterus, there are four indications by which one can determine the patency of the Fallopian tubes.

If the Fallopian Tubes are Patent.

(*a*) The manometer, having been set to zero mm. of mercury, the column of mercury will rise steadily to from 60 to 90 mm. of mercury and stay there, although it will occasionally first reach a point somewhat above 90 mm., in which case it will promptly drop back to that level. An increase in the intra-abdominal pressure, induced by movements of the patient, may make the mercury rise to 110 mm.

The patency of the Fallopian tubes can be determined after as few as two or three fillings of the glass bell—that is, after 100 to 150 cubic centimetres of gas have been passed into the abdomen, .

A greater volume is usually not necessary, as the amount of discomfort from the presence of the gas in the abdomen, although never great, is proportionate to the volume of gas injected.

(*b*) If the patient has not had an anæsthetic, which is seldom necessary, and sits up after the gas has been injected, she will usually complain of pain in her neck and right shoulder, or at least this symptom can be elicited, care being exercised not to suggest it too plainly. This symptom is caused by sub-diaphragmatic irritation of the vagus nerve by the gas.

(*c*) The presence of the gas in the abdomen, that is, the patency of the Fallopian tubes, may be established beyond all doubt by injecting 300 to 400 cubic centimetres of gas and placing the patient in front of a fluoroscope, when a white line will be seen to separate the liver from the diaphragm, but this method is too complicated for practical use.

(*d*) If a stethoscope be applied to the lower abdomen above the pubes, gas can be heard passing through the Fallopian tubes into the peritoneal cavity.

Of these four indications of the patency of the Fallopian tubes the most reliable is that of the mercury column.

If the Fallopian Tubes are Partly Occluded.

In partially occluded Fallopian tubes, such as when they are chronically diseased or, in normal tubes when engorged just prior to menstruation, the pressure in the mercury column may rise as high as 180 mm., showing that the gas has difficulty in passing through, proportionate to the amount of obstruction. It is wise, therefore, to repeat the examination in two weeks if, a day or so before the menstrual period, the test suggests that the Fallopian tubes are partly occluded. Many partially closed Fallopian tubes will show a normal, or at least an improved, patency in these circumstances.

If the Fallopian Tubes are Entirely Occluded.

In Fallopion tubes that are completely closed, the pressure rises steadily up to as high as one cares to allow; the upper limit of safety has been found to be 200 mm. of mercury, since rupture of a Fallopian tube, though a remote possibility, has been known to occur when the pressure rose above 250 mm. If the gas will not pass at 200 mm. it will not do so at 250 mm.

The nature of the obstruction will affect the behaviour of the mercury column; thus if the pressure is found to rise to 200 mm. three times, and the third time, after remaining at the 200 mm. mark a few seconds, it drops to 60 or 80 mm., this shows that the patency of the Fallopian tubes has been established. probably by

velamentous adhesions being broken down. This observation indicates the therapeutic possibilities as well as the diagnostic usefulness of the apparatus. A "kink" or angulation in the Fallopian tube causes no obstruction.

The apparatus can also be used to keep the Fallopian tubes patent when their patency has been established either by a plastic operation or by an application of gas as often as once a week. In a case in which the patency of the Fallopian tubes had been secured by gas, a year later the patient's tubes were found, on repeating the experiment, to be in a normal condition (80 mm.), and as the patient had been sterile though married 11 years, the *obstruction of her Fallopian tubes was unquestionably overcome without operation at the first examination.* Occasionally cases sterile for five to 10 years become pregnant two to three months after the use of the apparatus without further procedure, showing a possible therapeutic application for the cure of sterility.

Operations on patients who have been examined by this apparatus every time confirms the correct ante-operative diagnosis of the patency of the Fallopian tubes, and, although the appearance of the latter may be normal when the abdomen is opened, a fine whalebone bougie cannot be passed down the lumen of the tube in those in which the flow of gas is obstructed. This accuracy of diagnosis shows the instrument to be one of precision.

There is a further use of the apparatus. During an operation, if the end of the tin sound be left in the uterus gas may be passed whilst the Fallopian tube on one side is pinched between the finger and thumb. If now the other Fallopian tube is patent gas will escape. The procedure is then reversed to determine the patency of the other Fallopian tube.

In all partially or completely obstructed cases it is best to make three trials at the same time, and at intervals, away from menstruation, and advisable to postpone an operation for sterility if any gas passes through the Fallopian tubes. Many Fallopian tubes have been found closed that felt normal on digital examination and in which there was no pain or tenderness, although the patient was sterile and was being treated for imperfect ovulation, etc.

Dangers.

The dangers attending the use of the apparatus are mostly theoretical. In a large number of cases in which it has been used there have been no untoward results. Any contra-indication to intrauterine manipulation is a contra-indication to use of this apparatus.

It might be urged that by using this apparatus infection could be introduced into the peritoneal cavity. With surgical technique

and care that the vaginal cervix is cleaned, and, if necessary, treating an endocervicitis a week or two before the test is made, this is not possible, for should there be bacteria in the Fallopian tubes there will be obstruction to the flow of gas and danger could only result by damaging subacutely inflamed tissues, when the test should not be applied. Fallopian tubes do not rupture at 200 mm. mercury pressure, nor is there any bad after effect resulting from the use of the apparatus. No one should subject a patient, who had a slight rise of temperature after digital examination, to this method of examination.

There is no dilatation of the cervix necessary, the rounded end of the hollow tin sound slips into the uterine cavity with a little pressure, so the fear that infection may spread along the lymphatics to the Fallopian tubes, as resulted when efforts were made to introduce a speculum into the uterus, need not exist.

Fallopian tubes will not be ruptured if care is taken to adjust the pressure so that it does not rise too rapidly to be under the complete control of the operator and provided a pressure of 200 to 250 mm. of mercury is not exceeded.

The effect on the patient is never very painful; there is a sting when the cervix is grasped with the tenaculum, very little or no discomfort from insertion of the sound, and some backache if the Fallopian tubes are occluded and the pressure in the uterine cavity is run up to 200 mm. No pain as a rule is experienced from passage of the gas through the Fallopian tubes. There is, however, some pain in the right shoulder (phrenic irritation) when the gas reaches the upper abdomen, varying with the amount used. The carbon dioxide is absorbed very rapidly, so that in 15 to 20 minutes the patient can usually walk home.

The apparatus, in addition to being portable, is more accurate than those which act by injecting known quantities of sterile saline into the uterine cavity, determining, by the amount returned, the supposed patency of the Fallopian tubes.

The apparatus is manufactured by the Sorensen Scientific Corporation, of 444, Jackson Avenue, Long Island City, New York, and can be obtained through any reliable instument maker.

The Treatment of Puerperal Sepsis.*

A New Method Illustrated by Charts.

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Puerperal septicæmia continues to occur with considerable frequency in spite of modern preventive methods before and during labour.

In the year 1920, in England and Wales, there were nearly one thousand eight hundred deaths from this disease which represented a mortality rate of 1.87 per thousand births. This figure is no lower than that of preceding years, though ante-natal clinics and increased care in the management of labour should have exerted a beneficial effect. It seems, therefore, that while continuing the preventive campaign with unabated vigour, we should strive to find some method or methods of treatment which will abort the disease in its early stages or cure it when it is established.

Up to the present no line of treatment has been found to be very successful in septicæmia. In general practice local treatment is nearly always tried by giving intrauterine douches or even curetting, and drugs are administered by the mouth in the form of iron, ergot, aspirin, or quinine. A small dose of anti-streptococcal serum is sometimes given subcutaneously, and in a few picked cases a vaccine is made from organisms found in (or isolated from) the blood or uterus and given in small doses. As to the above drugs given by the mouth, I have been disappointed with them, and have felt that in many bad cases they are not absorbed by the stomach and, therefore, have very little, if any, effect; as regards local treatment, an intrauterine douche is not without risks if given without rigid aseptic precautions, which can only be carried out under an anæsthetic; and curettage is dangerous.

Owing to the doubt which has up to the present existed as to any form of treatment which is really efficient in the early stages, and the lack of any routine method of treatment, a patient suffering from puerperal infection of only moderate severity becomes worse till a condition of septicæmia supervenes; or, in some cases, harmful interference such as curetting or intrauterine douching without an

* Read before the Obstetrical Section of the Royal Society of Medicine.

anæsthetic is carried out and the disease is aggravated rather than cured. I have, therefore, endeavoured to find a method of treatment which could be used in a routine way in all cases of acute puerperal infection. The method which I have evolved and used consistently now for more than a year is based upon intravenous and intramuscular injections of bi-hydrochloride of quinine. The method has been employed and tested in cases where the clinical picture of puerperal septicæmia is present; the success obtained in these cases makes me feel that if the treatment be started early in all cases of puerperal infection it will, so to speak, abort and prevent the development of the septicæmia state.

Methods of treatment previously tried.

During the past eleven years—excluding 1914 to 1919—I have tried various methods of treatment—some old, some new—with results not sufficiently satisfactory to warrant continuation of their use. The tests provided were very rigid as many of the cases treated were very acute, some almost beyond hope of recovery. The majority of the cases were in the Isolation (Puerperal Septicæmia) Ward at the London Hospital, and were, therefore, under similar conditions of observation and nursing. Among the methods of treatment which were tried were certain intravenous injections and treatment with vaccines. Vaccines were worked out thoroughly some years ago as a result of which it was concluded that an autogenous vaccine was useful in some cases. Drugs used intravenously were collargol, neosalvarsan, and later—as a result of war experience—eusol and Dakin solution. These two latter seemed to be followed by a favourable reaction but, under critical observation, one death checked the enthusiasm inspired by several successes.

Present treatment.

In May, 1922, I was reconsidering the value of anti-streptococcal serum and the possibility of producing something of the nature of protein shock by injecting anti-streptococcal serum intravenously. As I judged this to be not devoid of risk I decided to revert to the subcutaneous injection of large doses and to follow this with intravenous and intramuscular injections of quinine bi-hydrochloride in water. This treatment was so successful from the beginning that for the past year it has been adopted as a routine and used in a series of 25 cases with only two deaths, of which one was in a patient who had been in hospital for twelve weeks and had passed from the acute to the chronic state when she suddenly got pulmonary embolus to which she succumbed.

The cases under treatment were in the special Isolation Ward in the London Hospital, reserved exclusively for patients diagnosed

to be suffering from puerperal septicæmia as distinguished from other forms of puerperal sepsis. Great care is taken in examining a patient before admission to this ward so as to be sure that the history—rigors, for instance—general condition, the pulse, the temperature, etc., are such as to warrant a diagnosis of septicæmia. Further, it is clear that no doctor will send up a patient for admission to hospital as puerperal septicæmia unless he is convinced of the severity of her condition. It is thus an exception to find a patient in the ward who may not be regarded from the clinical point of view as a true case of septicæmia.

Occasionally a patient may become rapidly better within 24 or 48 hours after admission without special treatment, but in any such case special treatment has been withheld and the case has not been included in the series.

As far as a routine can be adopted, the following method is carried out :—As soon as the puerperal woman shows any signs of acute sepsis or as soon as she comes under observation, careful examination of her general and local condition is carried out in order to decide whether exploration of the uterus is advantageous or necessary. This is, as a general rule, carried out if there is any history suggesting retention of placenta or membranes, if there is any abnormal bleeding, or if there is any foul discharge with subinvolution of the uterus, but only in a minority of cases. If exploration of the uterus is decided upon it is carried out with great care and asepsis, and always under an anæsthetic. Exploration of the uterus is not performed if the history of a normal third-stage is obtained, if the uterus is of normal size, if the lochia are unaffected, or if there is any abdominal distension or pelvic peritonitis. If exploration is carried out it should be done with very great care with the gloved finger so as to avoid causing bleeding ; the uterine cavity should be swabbed out with iodine and a hot intrauterine douche given. I do not consider continuous irrigation of the uterine cavity by the Carrel-Dakin method suitable or useful except in a special case. During the last twelve months I have explored the uterus less often than formerly. Other surgical treatment occasionally is required, *e.g.*, for pyæmic abscesses or peritonitis, but is not common in the acute stage.

The special treatment is as follows :—(1) *Injections of anti-streptococcal serum.* These are given for the first three days in doses of 30 cc. on each of the first two days, and 20 cc. the third day. (2) *Injections of quinine* (*a*) Intra-muscular injections of quinine bi-hydrochloride five grains in one cc. of sterile water are given in the buttock or thigh on alternate sides every day for six to ten days. It is important to massage away the solution from the site of injection. This is usually followed by some definite

improvement, which is shown on the charts by a diminution in the number of rigors or a drop in the temperature or pulse rate. An interval of a few days is allowed and the injections can be repeated. Intramuscular injections have been tried in almost every variety of case with extremely satisfactory results. There appears to be no risk attacked to the injections, and in only one case was there any ill effect—slight giddiness and headache. These intramuscular injections are useful not only in the early and in the acute stages of the disease, but in the more chronic stages, to hasten convalescence. The success attending intramuscular injections of quinine justified an investigation of the effects of (*b*) intravenous injections, in order to get a more rapid or increased effect in the worst cases. For this purpose injections containing quinine bi-hydrochloride, three grains in 10 ccs. of sterile water, have been employed. As a general rule, two or three injections have been given at intervals of 48 hours, but further injections may be given if the improvement is not maintained or if a relapse occurs. The intravenous injections should be followed by a course of intramuscular injections. Intravenous injections have been reserved for the worst cases so that the test should be as severe as possible. The results have been very striking, including the cure of two patients with panophthalmitis complicating puerperal septicæmia. Previously, I had thought this complication the most certainly fatal of all. More recently the dose of quinine given intravenously has been increased to five grains.

A routine method of carrying out the treatment may be tabulated as follows :—

Anti-streptococcal serum.

1st day of disease...	...	30 cc.
2nd day of disease...	...	30 cc.
3rd day of disease...	...	20 cc.

The serum is given on the first day the patient comes under observation, even though the disease has been in progress several days. If, however, the patient has had an injection of serum from her own doctor and more than two days have elapsed, no further injections of serum should be given.

Intravenous injections of quinine bi-hydrochloride, five grains in 10 ccs. of sterile water, on the 4th, 6th and 8th days of disease.

If ampoules of the quinine solution already prepared cannot be obtained, the five grains of quinine bi-hydrochloride should be

placed in a test tube together with 10 cc. of distilled water which should then be boiled.

The intravenous injections are best given by a 10 cc. syringe with an excentric nozzle, similar to that used for injecting salvarsan, etc. The needles should be boiled in oil in a test tube so that they will remain sharp and not get rusty.

Intramuscular injections of quinine bi-hydrochloride, five grains in 1 cc. of sterile water, on the 5th, 7th, 9th, 10th, 11th, and 12th day of disease.

It is very important to make these injections with strict asepsis and to massage the fluid away from the area injected; pain after injection is thus avoided, absorption is aided, and infection is prevented.

After this course of treatment the acute stage of the disease will have subsided and the convalescent stage will have been reached; if not, the intravenous and intramuscular injections should be repeated after an interval of a week.

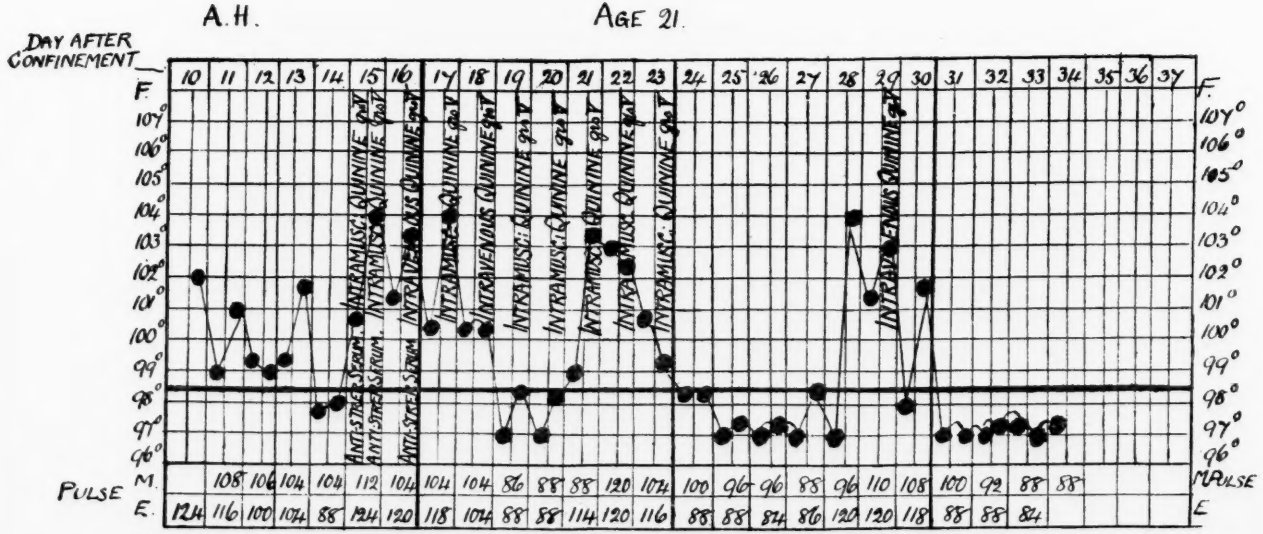
Reaction to the treatment.

In most cases no symptoms result at once, or later, from the injections, whether intravenous or intramuscular. But within a few hours of an intravenous injection the pulse and temperature will begin to fall and the patient will feel better.

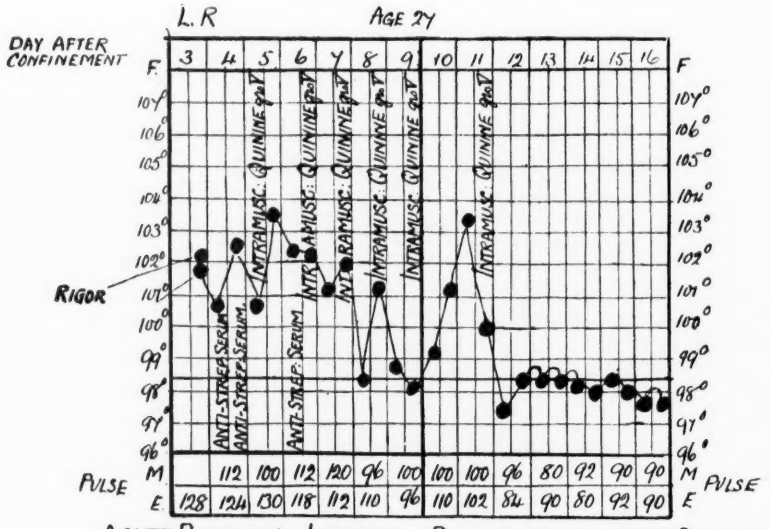
After intramuscular injections the improvement, as would be expected, is more gradual but none the less certain. The intramuscular injections may cause a little discomfort for a few hours but there is no risk of infection occurring later, nor even of a fixation abscess.

No symptoms of cinchonism have occurred even in the severest cases except in one patient who seemed to have an idiosyncrasy; however, she made a good recovery.

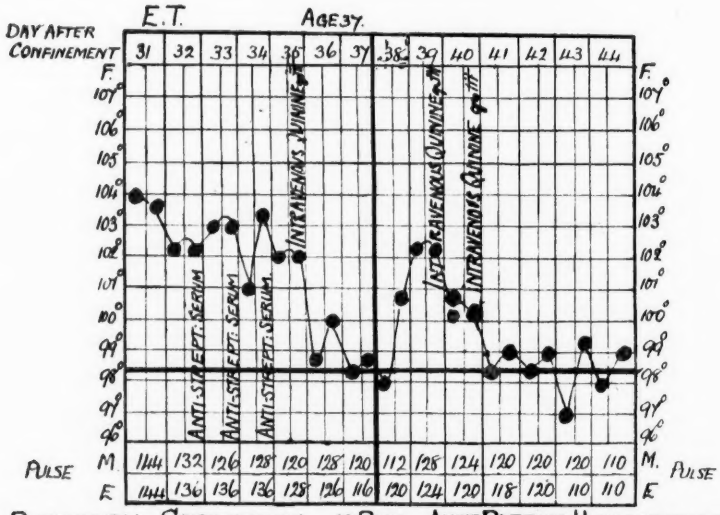
The effect of the treatment can best be illustrated by charts of the cases treated. If any value can be attached to figures showing the mortality of the disease in cases admitted to the Septicæmia Ward, the following are interesting. For the past twelve months, during which time the treatment has been carried out in a routine way, the number of cases admitted to the Septicæmia Ward was 36, with only three deaths; of these fatal cases one was hopeless on admission and died the day following, before quinine injections had been started. Thus, only two deaths occurred in the twelve months among the patients treated with quinine, a mortality of 5.6 per cent. Comparing this with previous years, the number of cases admitted from 1919 to 1921 was 146, the number of deaths, 50, giving a mortality of 34.2 per cent.



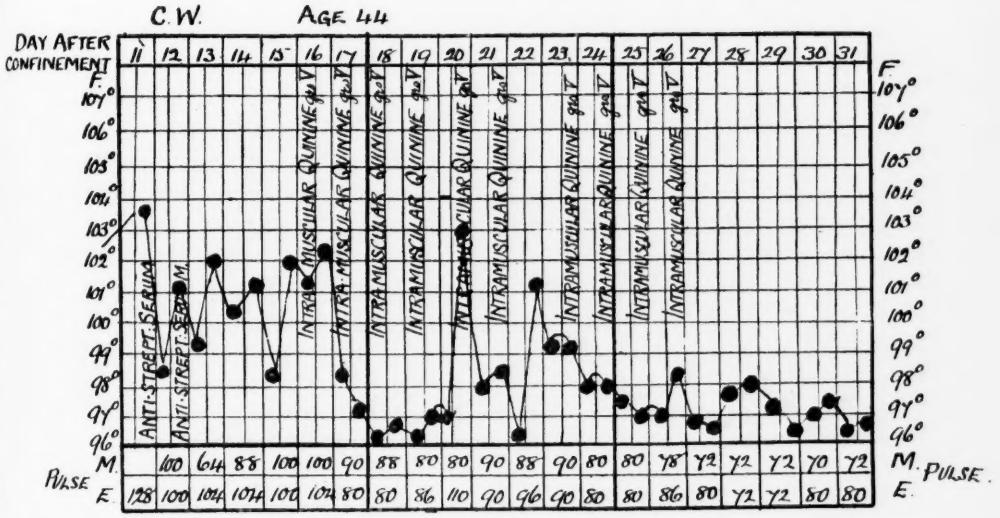
PUERPERAL SEPTICAEMIA SECOND PREGNANCY. NORMAL LABOUR. BLOOD CULTURE POSITIVE. TREATMENT – ① EXPLORATION OF THE UTERUS. ② ANTI-STREPTOCOCCAL SERUM. ③ INTRAVENOUS AND INTRAMUSCULAR INJECTIONS OF QUININE. GOOD RECOVERY.



ACUTE PUERPERAL INFECTION. RIGOR THIRD DAY AFTER DELIVERY TREATMENT WITH ANTI-STREPTOCOCCAL SERUM AND INTRAMUSCULAR INJECTIONS OF QUININE. GOOD RECOVERY



PUERPERAL SEPTICAEMIA. 10 PARA. ANTE PARTUM HAEMORRHAGE. LONG LABOUR. THROMBOSIS OF LEFT LEG AND PNEUMONIA. TREATMENT:— ① ANTI-STREPTOCOCCAL SERUM. ② THREE INTRAVENOUS INJECTIONS QUININE. ③ TEN INTRAMUSCULAR INJECTIONS OF QUININE. GOOD RECOVERY.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ACUTE PUERPERAL INFECTION. 4 PARA EASY LABOUR. B.B.A. NO EXAMINATION BY DOCTOR: TREATMENT.—① ANTI-STREPTOCOCCAL SERUM. ② TEN INTRAMUSCULAR INJECTIONS OF QUININE. RAPID RECOVERY.

The action of quinine.

The manner of action of the quinine is one of conjecture only. From a study of its action in malaria it is known that it is very active, even in very dilute solutions, on the lower forms of living protoplasm such as the amœba and the parasite of malaria. According to Cushny there is at first a diminution in the number of white corpuscles in the blood after quinine and a lowering of their vitality; this is followed by an increase in the number of white corpuscles. According to Roth "a single dose generally causes leucocytosis at first, probably arising from contraction of the spleen. This is followed by a fall in the number of white corpuscles, especially of the lymphocytes, though the polynuclear cells are also reduced. The polynuclears then increase in number until a distinct leucocytosis is present, but the lymphocytes remain reduced in number while in the preliminary leucocytosis they predominate."

In some of my series of cases blood-counts have been done before and after quinine injections, but no very definite information can be obtained therefrom. In one case the following figures were obtained:—

(1) Number of white corpuscles before treatment 23,200. Percentage of polynuclear neutrophils, 72.0 per cent. Percentage of small lymphocytes, 16 per cent.

(2) After some treatment, one week: Number of leucocytes, 10,880. Percentage of polynuclear neutrophils, 72.5 per cent. Percentage of small lymphocytes, 13.0 per cent.

(3) One week later: Number of leucocytes, 9,200. Percentage of polynuclear neutrophils, 66.0 per cent. Percentage of small lymphocytes, 25.5 per cent.

In one patient who died under treatment the leucocytes rose from 5,200 to 11,300 in the course of six days. The percentage of polyneutrophils changed from 68.0 per cent. to 81.0 per cent. The percentage of small lymphocytes fell from 14.0 per cent. to 8.0 per cent. These investigations are probably influenced by the presence of severe anæmia.

My own feeling about the action of quinine is that it may stimulate the living tissue cells to increased resistance and may in some way prevent the harmful effect of the poisons or toxins circulating in the blood.

My conclusions may be summarized as follows:—(1) The treatment of puerperal septicæmia by intramuscular and intravenous injections of quinine is of great value. (2) The treatment is also useful in all forms of puerperal sepsis both in the early and also in the more chronic stages. (3) Its action is preventive, or abortive, as well as curative; thus if given early in all cases of sepsis it will cure this and prevent the onset of septicæmia.

Instruments left in the Peritoneal Cavity: the effects and results of this accident as shown by an analysis of 44 hitherto unpublished cases.*

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My interest in cases in which solid objects have been unintentionally left in the peritoneal cavity was aroused by having on two occasions to operate for their removal. I may state that in both these cases the solid body in question had been inserted into the abdomen by someone else, and that to the best of my knowledge I have never yet left an instrument in a patient's peritoneal cavity.

The first case was one in which there was spontaneous partial extrusion of a pair of hæmostatic forceps from the peritoneal cavity through the cervix.

A patient, aged fifty, was sent to me because her doctor had found a sharp foreign body in the canal of the cervix. She had consulted him on account of constant pelvic pain. The history given was that nineteen years before she had had a laparotomy performed, in the country, for a "tumour," but no details could be obtained. Seven years after this she was delivered of a full-time child without difficulty, and had had moderate health, except for one attack of severe abdomino-pelvic pain which subsided under treatment with hot fomentations. The abdominal pain, with nausea and vomiting, gradually increased in severity for several years, and for these symptoms she had a second operation performed in a county hospital 18 months before I saw her. She was informed that the adhesions in the lower abdomen were so dense that nothing could be done, therefore the operation was abandoned and the abdomen closed. The pain and sickness increased, and six months later an offensive vaginal discharge commenced. The bowels were relaxed with frequent desire to defæcate, and there was frequency of micturition.

When I first saw her she looked toxæmic and wasted. The abdomen was distended, and there was a tender mass below and to

* Read before the Obstetrical and Gynæcological Section of the Royal Society of Medicine.

the left of the umbilicus. There was a hernia of the old laparotomy scar. On vaginal examination, a pointed metallic instrument could be felt protruding through the cervix for 4 cm. from the external os. The body of the uterus was bulky, and situated in the middle line. There was a mass on the left of, and above, the uterus, continuous with the tender area on the abdominal wall. The X-ray photograph showed a Spencer Wells hæmostatic forceps, with the handles towards the left iliac fossa and the points in the cavity of the pelvis.

It was obvious that any attempt to remove it by traction on the pointed end would lacerate the uterus severely, and possibly also damage the ureters. I, therefore, opened the abdomen, and was faced by a mass of very dense adhesions. With difficulty I reached the forceps; the points had eroded the uterus 5 mm. above the level of the bladder reflection; the handles had eroded the wall of the pelvic colon, and were lying inside the lumen of the gut. The forceps was removed and a panhysterectomy performed, in order to get rid of the infected uterus, and to give free drainage to the fæculent abscess that the forceps was lying in. Owing to the large deficiency in the gut wall, and the infiltration of the surrounding tissues, it was difficult to suture the hole in the colon, but finally the edges were united, and it was not thought necessary to do a colotomy. Large drainage tubes were inserted through the vagina, and through the abdominal incision.

The patient stood the operation well, but a fæcal fistula formed at the end of a week, and was still discharging six weeks later. She then commenced to have peculiar attacks of collapse with cyanosis, loss of consciousness, and vomiting. The first attack came on after eating eggs, which had been sent to the hospital, and she stated that she had never been able to eat eggs, as they had previously affected her in a similar manner. It was suggested that the attacks were anaphylactic in origin. In one of these attacks the patient died some six weeks after the operation.

The specimen shows a uterus 11 cm. long. Perforating the peritoneal covering of its left anterior surface is the pointed end of a Spencer Wells forceps, which emerges into the canal of the cervix and then protrudes 4 cm. into the vagina. The whole forceps measures 12 cm. long and is of the usual pattern now in use.

This case is a rare one, because of the extrusion of the forceps through a tough, thick-walled organ like the uterus. I have found no record of any other case in which this happened. It is also uncommon because of the long period that the foreign body remained in the peritoneum. It must have been left there either $1\frac{1}{2}$ or 19 years before, and the longer time is suggested by the history that the pain persisted and increased after the first opera-

tion, and was unchanged by the second. The existence of such dense adhesions at the second operation that it was soon abandoned also suggests that the inflammatory focus was already there. Also, if the forceps was left in at the second operation, it should have been finally found above the adhesions that the second operator did not separate, and not low down. It is a question that cannot be settled, but it seems probable that the instrument remained in the peritoneum for 19 years.

The second case was one in which a bone penholder was passed into the vagina by a patient who was unable to withdraw it. It remained in the peritoneal cavity from 8 a.m. on January 2nd, 1915, till 4 p.m. on January 5th, 1915. Even under anæsthesia no scar could be seen in the vaginal vault, or on the fundus of the uterus when the abdomen was opened. The penholder, with the ink stains still showing well, was found entirely wrapped up in omentum. I ligatured off the omentum containing the penholder, and closed the abdomen. The patient made an uninterrupted recovery.

In discussing these cases with my colleagues I found few of them had had experience of this accident, nor could I find much about it published, except one very valuable article by Crossen, and a few cases that had been published because they had given rise to legal proceedings.

In considering a question like the present, where negligence on someone's part comes in, it is obvious that the great majority of cases that are not the subject of legal action will never find their way into the literature at all. To get details of the unpublished cases I sent inquiries to surgeons in all parts of Great Britain. No names were asked for, but in order to obtain full, although anonymous, records, I posted printed inquiry forms with printed reply envelopes.

I wished primarily to find out what risk there is to a patient if an instrument is allowed to remain, say five or six days, in the peritoneal cavity. Such a question may be of importance if the loss of the instrument is not noted till the patient has recovered consciousness; if already suffering from such a degree of shock from operation that undoing the closed laparotomy incision may be attended by grave risk; and if it is desired to confirm the diagnosis and locate the instrument by radiography before proceeding to open up the incision. Secondly, after about what interval of time does the foreign body usually commence to cause symptoms, if its loss is not noted? Thirdly, what is its usual effect on surrounding viscera?

Crossen (*Amer. Journ. Obstet.*, 1909, Vol. 1, and also "Operative Gynæcology," 1915, p. 589) gives a short tabular summary of

50 cases that he collected from the literature from 1880 to 1907. In these 50 cases the articles left behind are: forceps, 41; drainage tubes, 3; rings, 2; Nélaton catheter, glass irrigator, scissors, "piece of instrument," and pair of spectacles, one each. The total of 51 instruments in 50 cases is explained by two pairs of hæmostatic forceps being left in one patient by Kosinski.

Many of the cases abstracted by Crossen are incomplete, and essential details are lacking, but an examination of his collected cases shows that some 24 certainly, or probably, lived; 13 died, and in 13 the details are inconclusive. The period the foreign body remained in the peritoneal cavity in the cases that recovered varied from a few hours to 10½ years, but it is of interest that in only 7 out of the 24 was the period over one year. The foreign body was removed by a subsequent laparotomy in 10 cases; removed through a sinus or abscess in seven cases; passed spontaneously *per rectum* in four cases; removed by colpotomy in two cases; and one was found in the bladder. In four of the non-fatal cases and two others it is stated that serious damage resulted to surrounding viscera.

Including a few cases in which foreign bodies had been passed into the peritoneal cavity either *per vaginam* or *per rectum*, I received the details of 39 cases; there are three specimens bearing on the subject in the Museum of the College of Surgeons, making 44 with the two cases recorded in detail above. The foreign bodies found were 29 artery forceps, two retractor blades, two glass rods, two bone knitting-needles, two hairpins, and drainage-tube, towel-clip, uterine dilator, piece of needle, pin, bone penholder and stone one each.

Of the 44 patients, 11 died, giving a mortality of 25 per cent. In these 11 fatal cases the foreign body is stated to have been present: several years (three cases); seven years (one case); two years (one case); one year (one case); five months (one case); three weeks (one case); and twice "unknown." In all cases, except those in which the details are wanting, severe ulceration or erosion of the surrounding viscera was present.

Of the 33 patients who recovered, cases are given in which the foreign body remained in the peritoneal cavity 7, 12, 15 and (?) 19 years. Of the 33 cases, 26 were treated by a second operation, and in the remaining seven the instrument was passed through a sinus or *per rectum*. The operations were performed within a few hours (five cases); within 48 hours (four cases); within a few weeks (eight cases); and the remaining nine during periods ranging from six months to many years.

A consideration of the details of the cases seems to show that, as would be expected, the best result is obtained by an immediate removal of the foreign body, if the patient's general condition will

permit of a second operation. But if the loss of instrument is not noted at once, or if the patient's general condition contra-indicates an immediate second operation, there does not seem to be any grave risk in leaving it inside for a few days. A solid metal instrument does not seem to cause the onset of peritonitis as rapidly as a blood-soaked gauze sponge; and a consideration of the cases does not indicate that the viscera suffer any severe damage within a few days. A striking fact is the protective action of the omentum in surrounding the foreign body and shutting it off from the rest of the peritoneal cavity. This is well shown in the second specimen exhibited to-night.

The frequency with which this accident occurs came as a surprise to me. I received details of 39 fresh cases by post, and 51 forms were not returned to me at all, in spite of the fact that I especially asked for the form to be returned with a negative on it and sent a stamped addressed envelope to ensure its remaining anonymous. It seems reasonable to think that a large proportion of those 51 unreturned forms must have given details of fresh cases if their recipients had returned them. Again, it should be noted that only surgeons on the larger hospitals were circularized, and if the records of cases operated on in cottage hospitals, naval and military hospitals, etc., could be obtained it is probable that my numbers would be largely increased.

Most of the cases in which any date was given occurred within the last 15 years, so that my inquiries show that, quite roughly, at least 40 of these accidents have occurred in 180 months, or, in other words, once in every $4\frac{1}{2}$ months a patient is exposed to this unnecessary risk in Great Britain alone. It is therefore desirable to consider what can be done to diminish the risk of this accident.

I have deliberately avoided so far all reference to sponges and swabs, and definitely asked that these should not be included in my inquiry form. But it is worth while emphasizing the protection given by the use of 6 or 12 yard rolls of gauze for packing off intestines and sponging, instead of using large numbers of small pieces of gauze. In counting a large number of swabs by an assistant or nurse, the margin of human error exists, and this can be avoided and time saved by the use of rolls of gauze as continuous sponges.

Regarding instruments, the same principle can be applied, and the numbers of instruments in use, especially Spencer Wells forceps, reduced to a minimum, an extra supply in a separate package being kept in the operator's bag for emergencies. Also any instrument brought near the abdomen while the peritoneum is open should measure 6 inches in length—an exception to this rule must be made in the case of needles. To conform with this ideal

I never use towel clips—it is quite easy to fix all towels by two stitches, one at the pubes and one at the upper end of the incision. Again, it is quite easy to fix efficiently the rubber sheeting, towel, or whatever is used to protect the edges of the abdominal wall by pieces of sheet lead, 3 inches broad and 12 inches long, which can be bent round the edge of the wound. This method has long been used by Oldfield and other members of the Leeds school. The use of a Reverdin needle not only saves time but largely reduces the number of small needles in use. A Reverdin of suitable shape can be used satisfactorily except at the bottom of a deep wound. In the Trendelenburg position instruments tend to roll down towards the incision and the use of an instrument tray (such as that suggested by Bonney) with a large flange will prevent this. While operating, all hæmostatic forceps should be replaced by ligatures as soon as possible, instead of leaving them attached to bleeding points at the edges of the wound or within the peritoneal cavity. No instrument that has loose parts which are liable to become detached should be used.

In the following list the details are given as far as possible in the words used by the reporters of the case. The kind of instrument and the position where found, the nature and date of the first operation, the symptoms produced, the treatment adopted and the condition of the viscera disclosed, together with any note of special interest, such as the presence or absence of a sinus in the abdominal wall, whenever such details have been reported.

1. Short Spencer Wells forceps. Among small gut. Hysterectomy, several years before. Symptoms unknown. Gut ulcerated. Whole of forceps lying in cavity of gut. No external sinus. Enterostomy. Death.

2. Short Spencer Wells forceps. Laparotomy, several years before. Symptoms unknown. Gut ulcerated. Whole of forceps lying in cavity of gut. No external sinus. Enterectomy and anastomosis. Death.

3. Small Spencer Wells forceps. Among intestines. Ruptured gastric ulcer, many weeks before. Symptoms: fæcal fistula in cæcal region. Ulceration of ascending colon. Extraction through fistula. Death from peritonitis.

4. Small Spencer Wells forceps. Partly in peritoneal cavity and partly in bladder. Ovariotomy, five months before. Symptoms: like stone in bladder. Bladder perforated and very dense adhesions present. Point of instrument seen during cystoscopy. No external sinus. Laparotomy. Death from peritonitis.

5. Six-inch Spencer Wells forceps. Among small gut. Laparotomy, several years before. Symptoms: acute obstruction. Two or three adjacent coils of small gut ulcerated. No external

sinus. Resection of gut. Ring carcinoma of pelvic colon also found and so colostomy performed at same time. Death.

6. Five-inch artery forceps. Among small gut. Gastro-enterostomy, two years before. Symptoms: pain increased by taking food. Instrument detected by radiogram. Gut perforated. No external sinus. Double resection of small gut. Death.

7. Spencer Wells forceps. ? position. Appendectomy. ? date. ? symptoms. ? treatment. Probably no sinus present. Death.

8. Five-inch Spencer Wells forceps. Among small gut. Ruptured ectopic pregnancy three weeks before. Symptoms: fever, pain. Mass in pouch of Douglas. Intestine damaged. No external sinus. Resection of small gut. Death.

9. Four-inch Spencer Wells forceps. In left half of pelvis, handles pointing downward. Ovariotomy, seven years before. Symptoms: fever, emaciation. Discharge from fæcal fistula in left iliac fossa for six months. Sinus explored and instrument removed. A portion of one handle of the forceps could not be found. Death.

10. Towel clip 3 in. long. Position not stated. Laparotomy, one year before. Symptoms ? Found at autopsy. Royal College of Surgeons Museum, 2393.I.

11. Hairpin. Lower abdomen. ? passed in per vaginam. Symptoms: pelvic peritonitis. Laparotomy for purulent peritonitis. No obvious damage to viscera. Royal College of Surgeons Museum, 2343.I. Death.

12. Three-inch Spencer Wells forceps. Below umbilicus in middle line. Ovariotomy, six weeks before. Symptoms: point of forceps palpable through scar. No damage to viscera. Forceps found wrapped in omentum. No external sinus. Removal by laparotomy. Uneventful recovery.

13. Small Spencer Wells forceps. Position unrecorded. Removal of tumour (probably renal), eighteen weeks before. Symptoms: rectal pain and sinus. Passed spontaneously per rectum. Recovery.

14. Spencer Wells forceps. Upper abdomen. Ovariotomy, several weeks before. Symptoms: hard mass in upper abdomen. Adhesions but no erosion of viscera. No external sinus. Laparotomy. Recovery.

15. Five-inch Spencer Wells forceps. Pelvis. Salpingo-oöphorectomy, seven years before. Symptoms: abdominal and rectal pain. Passed spontaneously per rectum. Ulceration of rectum. Recovery.

16. Small Spencer Wells forceps. Pelvis. Panhysterectomy, a few hours before. No symptoms. Radiogram taken. No damage to viscera. Removal per vaginam. Recovery.

17. Five-inch artery forceps. Among intestines. Cæsarean section, 48 hours before. No symptoms. No damage to viscera. Radiogram taken because instrument missed after operation. No external sinus. Removal. Recovery.

18. Seven-inch Spencer Wells forceps. Upper abdomen. Radical cure of ventral hernia, four months before. Symptoms? Ulceration of bowel. No external sinus. Enterectomy. Recovery.

19. Artery forceps. Pouch of Douglas. Ovariotomy, six hours before. No symptoms. No damage to viscera. Instrument missed after operation and palpated by bimanual examination. Removal. Recovery.

20. Nine-inch Spencer Wells forceps. Pouch of Douglas. Subtotal hysterectomy, seven years before. Symptoms: pelvic pain. Ulceration of vagina. Points of forceps palpable on vaginal examination. No abdominal sinus. Extraction per vaginam. Recovery.

21. Small Spencer Wells forceps. Pelvis. Ileo-colostomy, six months before. Symptoms: left iliac pain. Passed spontaneously per rectum. No abdominal sinus. Complete recovery.

22. Spencer Wells forceps. Attached to omentum. Ovariotomy, 24 hours before. No symptoms. No damage to viscera. Loss of instrument noticed soon after abdomen closed. Removal. Recovery uneventful.

23. Kocher's artery forceps. Among small gut. Operation for perforated duodenal ulcer, three weeks before. No symptoms. Two inches of instrument lay inside lumen of gut. Instrument only discovered by accident during radiogram of bismuth meal. No sinus. Removal. Suture of bowel. Complete recovery.

24. Eight-inch Spencer Wells forceps. Lower abdomen. Hysterectomy, twelve days before. No symptoms. Forceps missed after operation, but patient too ill for immediate search to be made. No sinus. Radiogram on tenth day. Removal by laparotomy. No damage to viscera. Uneventful recovery.

25. Six-inch artery forceps. Pelvis. Ovariotomy, nine months before. Symptoms: febrile convalescence, recurrent abdominal pain, rectal pain and discharge. Passed spontaneously per rectum. Rectum ulcerated. No abdominal sinus. Recovery.

26. Small Spencer Wells forceps. Right iliac region. Removal of broad ligament cyst, ten days before. No symptoms. Forceps missed three hours after operation. Radiogram taken. No sinus. Removal. No damage to viscera. Recovery.

27. Eight-inch Spencer Wells forceps. Pelvis. Salpingectomy, four years before. Symptoms indefinite. Abdomen examined on account of hæmatemesis, and forceps felt through wall of lower

abdomen. Radiogram taken. Removal. Severe adhesions present, but no erosion of viscera. No sinus. Recovery.

28. Five and a half inch artery forceps. Pelvis. Hysterectomy, a few hours before. No symptoms. Forceps missed two hours after operation. Removal by laparotomy. No damage to viscera. Recovery.

29. Four and a half inch artery forceps. Lower abdomen. Ovariotomy, four hours before. No symptoms. Forceps missed three hours after operation. Removal by laparotomy. No damage to viscera. Recovery.

30. Flange of a Berkeley retractor. Lower abdomen. Hysterectomy, twenty-four hours before. No symptoms. Instrument missed after operation. Radiogram taken. Removal by laparotomy. No damage to viscera. Recovery.

31. Blade of retractor 3 ins. long. Loin. Hysterectomy, fifty-four hours before. No symptoms. Radiogram taken. Removal by laparotomy. No damage to viscera. Recovery.

32. Artery forceps. Lower abdomen. Laparotomy, twenty-four hours before. No symptoms. Removal by laparotomy. No damage to viscera. Recovery.

33. Drainage tube $2\frac{1}{2}$ ins. long. Partly in bladder and partly in peritoneal cavity. Hysterectomy, twelve years before. Symptoms: leucorrhœa, for 12 years, cystitis for three weeks. Removal by suprapubic cystotomy. Ulceration of bladder. No abdominal sinus. Recovery.

34. Glass rod 4 ins. long. Recto-vesical pouch. Colostomy, four and a half months before. Symptoms were referred to a large wound in the buttock. Removal during an operation for excision of rectum. Dense adhesions but no serious erosion of viscera. Recovery.

35. Flanged glass tube 2 ins. long. Under right rectus muscle. Operation for relief of ascites, fifteen years before. Symptoms: none except ventral hernia. The tube is still there and the patient in good health. The ascites is cured. No external sinus present.

36. Hairpin (straightened). Passing from rectum and transfixing the Fallopian tube. ? passed into rectum. ? two months before. Symptoms: dysmenorrhœa, rectal pain. Removal by laparotomy. Peritonitis round tube. Ulcer in rectum. No abdominal sinus. Recovery.

37. Five-inch bone knitting-needle. Left iliac fossa. Pushed through uterus, fifteen months before. Symptoms: abdominal pain, increased by movement. Radiogram taken. No sinus. Removal by laparotomy. Knitting-needle surrounded by omentum. No damage to viscera. Recovery.

38. Uterine dilator 8 ins. long. Below liver. Pushed through

uterus four days before. No symptoms. Radiogram taken. No sinus. Removal by laparotomy. No damage to viscera. Recovery.

39. Bone knitting-needle 10 ins. long. Pouch of Douglas. ? pushed through vagina. Symptoms: intestinal obstruction. Removal by laparotomy. No damage to viscera. No sinus. Recovery.

40. Piece of steel needle, 1 cm. long. Appendectomy, two years before. Symptoms: persistent abdominal sinus. Sinus opened up and needle removed. Recovery.

41. Pin. Back of broad ligament. No previous operation. ? Swallowed. No symptoms. Removed during ovariotomy for ovarian cyst. Slight adhesions, but no damage to viscera. No sinus. Recovery.

42. Stone. Lower abdomen. Stone was accidentally forced through the rectum three days before. Symptoms: Pain. Removal by laparotomy. Royal College of Surgeons Museum 2310.I. Recovery.

43. Four-and-a-half-inch forceps. Left iliac fossa, perforating uterus. Two laparotomies. ? Eighteen months, or ? 19 years. Symptoms: Pain, diarrhœa, leucorrhœa. Radiogram taken. Removal by abdominal hysterectomy and suture of colon. Severe ulceration of colon present. No abdominal sinus. Sudden death six weeks later, as recorded in detail above. Royal College of Surgeons Museum.

44. Bone penholder 6 in. long. Above umbilicus, wrapped in omentum. Pushed through vagina three days before. Symptoms: Pain. Removal by laparotomy. No damage to viscera. Uneventful recovery. University College Hospital Museum.

45. Five-inch Spencer Wells forceps. At level of umbilicus. Laparotomy for intestinal obstruction two weeks before. No symptoms. Loss of instrument noticed when arranging operating bag ten days after operation. Radiogram taken. Removal by laparotomy. Severe adhesions and ulceration of small bowel in two places. Death. (Report of this case received subsequent to the paper being read at the Royal Society of Medicine.)

REVIEW.

The Development and Structure of the Human Placenta.*

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As the placenta is not evolved until after the impregnated ovum is embedded in the uterine decidua it will be profitable, first of all, to consider the manner in which the ovum is nourished prior to this embedding.

It is not, at present, known by what means the unfertilized ovum is nourished while still in the ovary : the fine striæ seen in the zona pellucida are supposed by some to constitute channels by which nourishment can reach the ovum from the cells of the corona radiata. But, as the ovum reaches maturity, specialized yolk granules appear round about the central part of the cell and push the nucleus to one side. These granules are highly refractile bodies : they increase in number as the ovum matures and Beneden has given them the name of deutoplasm. It is known that in ova other than human these granules are used up during the earliest stages of segmentation and they are, therefore, to be regarded as a possible source of nourishment elaborated in advance to tide the segmenting ovum over this period.

After fertilization the cells of the corona radiata disappear and are replaced by a sticky layer of albuminous material which is homogeneous and derived partly from the disintegrated cells of the corona radiata (Robinson) and partly from tubal and uterine secretion (Bonnet). " With regard to its functions, there is little doubt that the degenerating cells of the corona radiata, and later the albumin layer, serve as food for the growing mass of the ovum in the Fallopian tube and uterus " (Lochhead). In support of this theory Jenkinson has demonstrated the presence of fat and protein substances in this albuminous layer in the mouse while Emrys Roberts has shown that, in the guinea pig, the secretion of the uterine glands contains a protein which probably affords nourish-

* The substance of part of a report to the Medical Research Council on "The Present Position of our Knowledge Regarding the Human Placenta."

ment to the ovum. Bonnet holds that the corona radiata is absorbed by the ectodermal cells of the blastodermic vesicle and is used by the latter as food. After the disappearance of this albuminous envelope the segmenting ovum now lies free in the tube or uterus and has to seek a new source of nourishment.

The result of the cell division, so far, has been to encase the ovum with a layer of ectodermal cells—the extraembryonic ectoderm—while the embryo begins to appear at the spot where an ectodermal cavity—the amniotic cavity—and an ectodermal cavity—the vitelline sac—are in apposition. The extraembryonic ectoderm has a specialized function to perform, namely to find nourishment from the surrounding tissues for the rest of the ovum including the embryo; so that a provision is made for the nutriment of the embryo in actual advance of the formation of the latter. On account of this function Hubrecht gave the name of *trophoblast* to the extra embryonic ectoderm.

A suitable part of the uterine mucosa—decidua—is selected and into that part the ovum sinks by piercing the surface epithelium, which is dissolved by the histolytic properties of a ferment which is supposed to be secreted by the trophoblastic cells of the ovum. As it sinks into the substance of the stratum compactum this solvent action is exerted on all the surrounding decidual tissue so that the growing ovum comes to be surrounded by a zone of necrotic decidua which is held to constitute still another source of nourishment for it.

So far then, we visualize the ovum as covered with trophoblast whose function is to dissolve the decidua and also to abstract proper nutriment from the surrounding tissues for the various structures, including the embryo, that are beginning to appear in its interior: thus at each stage of its development a source of nourishment is seen to be provided; it has penetrated into the substance of the uterine decidua and the aperture of its entry through the surface epithelium is sealed up by blood clot (Bryce) or fibrin (Peters).

The above stages which have not yet been observed in the human subject are deduced by analogy from the ova of lower animals. We have avoided the discussion of many attractive questions, *e.g.*, the factors which determine the site of implantation, the time taken in the transit of the ovum to uterus, the influence of the menstrual cycle phases on implantation and many more, remembering that our object is to trace the elaboration of the placenta and not to be side-tracked into other considerations.

It is universally accepted since Peters published the account of his ovum that the embedding in the uterine decidua is by a process of actual penetration so far as the compact layer of the decidua

(*vide infra*), so that the Hunterian and other theories of circumvallation need not be discussed.

The ovum, then, covered by a more or less even coat composed of a layer of trophoblast is lying below the decidual surface and by its presence divides the decidua into decidua vera, basalis and capsularis, these three coming into contact with one another at the margin of the ovum—decidua marginalis. The cavity which separates these decidual layers, which is usually somewhat larger than the contained ovum, is known as the implantation cavity.

As the ovum penetrates the surface between the mouths of glands (it is too big to enter a gland lumen) its relationship to the glands deserves mention: some glands are destroyed towards the surface of the uterine mucosa and the deeper parts of the lumina of the glands open into the implantation cavity. Again the glands at the periphery are pushed aside by the growing ovum with consequent outward baying of their lumina. As the ovum grows the blood supply to the decidua basalis developes in excess of that to the decidua capsularis; this feature is not marked at present but becomes increasingly evident with growth of the ovum. The blood clot (Bryce and Teacher), or mushroom-shaped closing coagulum (Peters) becomes organized in its basal layers to form Reichert's scar over the summit of the decidua capsularis—the point of original penetration of the ovum.

It is necessary to take stock of all these features in order that the further stages of development of the ovum, now to be described, may be appreciated. The epiblastic covering now assumes true trophoblastic activities by sprouting out in buds all round the circumference of the ovum—which has been demonstrated in the case of the human ovum, and in this specimen (Bryce—Teacher) it is seen that the trophoblastic cells are arranged in two layers: the superficial layer consists of a plasmodium in which definite cell walls are not seen and deeply stained nuclei are, scattered irregularly in this plasmoidal mass, in some places scanty and in other places closely congregated. The protoplasm is generally described as being granular and of a foam-like appearance; Webster and others have shown that this appearance is due to the cutting across at various angles of innumerable striæ which penetrate, in a close network, the whole plasmodium. The deep layer is composed of ordinary cells of various sizes and shapes according to the amount of mutual compression exerted, and cell walls are clearly evident with protoplasm and deeply-staining nuclei.

These trophoblastic buds are known as chorionic villi; the superficial layer of plasmodium has received several names but the name *syncytium*, first used by Kossmann and Merttens, is now generally applied, while the deep cells at this or later stages are termed

Langhans' layer from the name of the investigator who first accurately described them. Prior to this stage the formation of the cavity of the extraembryonic cœlom in the common mesoderm in the interior of the ovum has resulted in the trophoblast becoming lined by a layer of mesoblast; this trophoblastic coat from which the buds sprout is known as the *chorionic membrane* or *chorionic plate*. The buds or villi, so far, are composed of ectodermal cells and are known as primary villi; soon the mesoderm layer of the chorionic membrane is seen to insinuate itself into the centre of each primary villus to form for it a fibroblastic core. The secondary villi are thus formed. The early stage of this penetrative process is well shown in Johnstone's ovum.

So far the growth of the villi has been uniform all round the ovum; the villi in their centrifugal growth have everywhere invaded the decidua (basalis, marginalis and capsularis). Owing to their proteolytic action these villi destroy whatever tissue they come in contact with and of these the most important structures are the decidual blood vessels, which are eroded by the villi and hence the contained blood escapes between the villi so that in as early a specimen as the Bryce-Teacher or Peter's ovum the primitive villi are seen to lie bathed in a pool of maternal blood. The next stage—the hæmotrophic stage—of development is thus entered upon, and since the mesodermic cores of the villi as yet contain no blood vessels the nourishment of the ovum must be by direct absorption of nutrition from the maternal blood by the chorionic cells. The process of development has, so far, been rapidly sketched; certain points, however, require more detailed consideration before we proceed further.

Trophoblastic Epithelium.

The trophoblastic epithelium, as stated, consists of two layers. The inner layer of Langhans' cells, which at first form the major part of the primary villi, by the end of the third week have become spread over the mesodermic core in a single or double layer. Here the cells are mostly rounded in shape with relatively large oval or circular nuclei. At the extremities of the villi these cells show a high degree of proliferation, becoming many-layered, polygonal in shape and larger than the others. The ova of Bryce-Teacher and Peters are seen to lie in a cavity in the decidua larger than the ovum itself; as the villi grow outwards they gain attachment by their tips to the walls of this cavity and, by eroding the blood vessels, so cause the implantation cavity to be occupied by exuded blood. It is, therefore, where the villi are attached to the maternal decidua that the proliferation of the cytotrophoblast of Langhans' cells occurs. The proliferating cells spread in a direction mainly over the surface

of the decidua, but to some extent also deeply so that in some cases scattered Langhans' cells are found in the deeper layers of the decidua or even in the muscle of the uterus. These proliferating Langhans' cells—cell-nodes or cell-columns—may, in some cases, present an appearance very like decidual cells and have frequently been mistaken for the latter; indeed some observers have regarded them as derived from decidua, but the present-day opinion regarding their origin is as stated. The main functions of the Langhans cells would appear to be, firstly, histolytic on the surrounding tissues, secondly, fixative in order to anchor the ovum, and thirdly, nutritive in abstracting aliment for the ovum and its contents first of all from the surrounding tissues and later from the exuded maternal blood.

The outer cell layer—the syncytium—has given rise to much discussion, being one of the most debated structures in histology. Regarding its origin many views have been expressed, and Peters (quoted by Webster) was able to collect 10 different theories in this respect. We may disregard most of these and confine our attention to four:—

(*a*) Langhans and Strahl held that the syncytium is derived from the surface epithelium of the uterine mucosa which is inverted on the surface of the advancing and penetrating villi. This presupposes that the ovum is implanted on the surface of the uterine mucosa which it does not penetrate, and in view of our knowledge to the contrary this theory must fall to the ground.

(*b*) Jansenske's view was that this layer represented glandular epithelium which had been invaginated on the surface of the ingrowing villi. This view is open to the same objection as the previous theory; again, owing to its size, the ovum could not enter a gland lumen, as it is about 0.2 mm. in diameter at the time of implantation (Grosser) while the lumina of the uterine glands is only about 40 to 50 μ in diameter (Frank). Furthermore, in cases of ovarian pregnancy in which no uterine epithelium—surface or glandular—is present, well marked syncytium is usually to be seen.

(*c*) Turner and Waldeyer were of the opinion that the growing villi insinuated themselves into the lumina of the dilated capillaries and so acquired a covering of endothelium which thus formed the outer—the syncytial—layer of the villi. According to this theory the intervillous spaces are greatly dilated capillaries whose walls are invaginated to a varying degree. This view was supported by Pfannenstiel, but was soon disproved by more accurate histological methods.

(*d*) The universally accepted view at present is that the syncytium is formed from the Langhans' cells and so is of fœtal origin.

The appearances seen in the Bryce-Teacher ovum practically

prove this origin. The syncytium is regarded as derived from the deeper layer of cytotrophoblast but the exact process of formation is unknown; Peters believed that intervening cell walls of the Langhans' cells break down and so produce the multinucleated appearance, but Teacher regards the process as a continual division of the nuclei of these cells without cell division so that the syncytium represents a very large giant cell. The actual process is not of great moment so long as we know the source.

Function of the Syncytium.

The function of the syncytium has been much discussed; Hubrecht, Marchand and Bonnet held that it constituted a reaction on the part of the trophoblast when it comes in contact with maternal structures. But, as Johnstone points out, well developed syncytium present in parts such as the chorionic plate which are not in contact with maternal tissue, so that this theory would require modification as the stimulus must be exerted apart from actual contact with, probably mere approximation to, maternal tissues.

Peters regarded syncytial formation as a reaction on the part of the Langhans' cells to the presence of maternal blood, its formation producing a layer of tissue which prevents coagulation and so allows circulation of the maternal blood.

Bryce, however, quotes van Beneden to show that the syncytium is formed probably before the blood lacunæ, but this does not dispose of Peters' theory, as the syncytial formation may occur in advance of the actual necessity for it.

Grosser suggests that there are probably two generations of syncytium: the first is associated with implantation and the concurrent intense histolysis. Later on this degenerates and the function of breaking down decidua is transferred to the Langhans' cells. Then, with the formation of the blood lacunæ the second generation of syncytium appears, whose function is to extract nourishment from the maternal blood in the lacunæ and also to prevent coagulation of that blood. We may take it then that the functions of the syncytium are (*a*) histolytic, (*b*) anticoagulative, and (*c*) alimentary.

The structure of the syncytium is that of a plasmodium spread in irregular thickness over the surface of the chorionic membrane and villi; in some places it is thick and heaped up, elsewhere thin and scanty and, here and there, not to be seen. The nuclei are also irregular in distribution, small and darkly staining. As stated above, the protoplasm is of a granular and foam-like appearance; it very soon shows vacuolation and, as this increases, the syncytium assumes a spongy appearance.

Bryce and Teacher hold that a ferment for the solution of the

decidua is produced in these vacuoles, and when this ferment has been expelled the cavities left become filled with maternal blood, and so the blood lacunæ or primary intervillous spaces are formed.

In early specimens the free border of the syncytium is smooth, but after about the second week careful examination will show that it is distinctly striated. This appearance was first described by Minot and is seen to consist in the formation of a series of fine striæ or cilia running perpendicularly to the free border; at their bases are knobs—blepharoblasts—and Bonnet points out that their presence proves the fœtal origin of the syncytium, as cilia are seen always on the superficial aspect of cells. Kastschenko believed that these cilia projected on the surface and by their movement created a stream in the maternal blood in the intervillous spaces. Lenhossek, however, could observe no movements; he called them stationary cilia, and ascribed to them the function of breaking down decidual vessel walls during the burrowing of the ovum. Others again hold that the cilia are merely hollow rods or pores by which nutriment may enter the syncytium or by which a secretion of the syncytium may be expelled into the maternal blood to prepare its constituents for transference to the fœtus, while von Spee attributed the appearances to the roughening edge of the protoplasm by a strong film of fluid—maternal blood—in the blood lacunæ. Finally, these striæ have been regarded as artefacts produced by the methods of fixing, but Hofbauer showed that they are seen best in fresh specimens and so are probably vital structures.

The mesodermal core of the villi, as explained, is an outgrowth of the mesoderm of the chorionic membrane. In the early stages this stroma or matrix is of a very loose myxomatous fibrillated appearance containing spindle and stellate cells and their connecting processes. These connecting processes form a network in the matrix and may represent a series of lymph channels. Later on these cells become more spindle-shaped and more closely packed so that the stroma becomes denser. Blood vessels do not appear in the villi until about the third week and are, at first, small and merely endothelial-lined slits, but later become thicker walled and more evident.

Intervillous Spaces.

The known facts regarding the origin of the intervillous spaces do not render the process of their formation quite clear. Bryce and Teacher's ideas have been previously mentioned, but Peters supposed that the blood was extruded from the maternal vessels under arterial pressure and so forcibly excavated for itself cavities in the villous trophoblast. The former is the theory generally accepted at present. Frassi was of opinion that the trophoblast

cells actively separated from each other, grew apart and joined up again to form cell columns, the spaces between which became the intervillous spaces, while Sfameni and Ercolani considered that the lacunæ represented merely dilatations of blood vessels and that the essential feature is the expansion of the uterine wall capillaries caused by the enlargement of the uterus during pregnancy. Two neighbouring capillaries might thus easily come in contact and the wall between them at last become torn. This process would be repeated, and finally one large blood space would be formed out of a number of fused capillaries. According to these authors the formation of the blood lacunæ is the result of purely physical conditions of the uterine musculature. D'Echia is of opinion that the blood lacunæ originate from blood capillaries surrounded by syncytium-like elements. The walls of these capillaries wear out and perish, thus allowing the blood to flow freely into the space surrounded by these elements.

Normally these blood lacunæ, which later become the intervillous spaces, are filled with maternal blood, although Marchand has stated the contrary.

The blood in the spaces does not coagulate, and this would indicate some peculiar function of the trophoblast and especially of its syncytial layer in preventing this. Hofbauer supposes the elaboration of a thin layer of albumose on the surface of the villi for this purpose, but later observers have not confirmed this finding. At this stage, then, the entire ovum is surrounded by villi which project into a pool of maternal blood which does not coagulate but slowly circulates in the compound intervillous spaces and is, sooner or later, returned to the maternal circulation, no doubt after having parted with its nutritive substances.

Decidua.

It is not proposed to go into detail in describing the structure of the decidua as the main points are known to all. Decidual formation may be defined as the reaction on the part of the uterine mucosa to the conditions of pregnancy.

The most prominent feature of decidual formation is hypertrophy of all the elements of the mucosa; the blood vessels dilate and become tortuous; the glands become hypertrophic, convoluted and dilated, and the epithelium projects here and there into the lumen of the gland as papilliferous elevations with a core of stroma; but the main change occurs in the interstitial tissue where the decidual cells are formed in great abundance.

The decidual cells are large and may be of any size up to 50 μ. in diameter; in shape they are round, oval or polygonal from

mutual pressure. The nuclei are round and vesicular and stain but slightly with the ordinary reagents.

All the decidual cells are not formed at the same time, so that here and there unaltered interstitial cells are found, and all degrees between this and the fully-formed decidual cell are seen. On this account Marchand in 1904 divided decidual cells into two classes: large and small. Many of the large decidual cells degenerate during pregnancy and are absorbed by leucocytes, but the majority are cast off during or just after birth. The result of this hypertrophic decidual formation is that the uterine mucosa in early pregnancy becomes succulent, hyperæmic, thrown into longitudinal folds and greatly thickened, so that between the second and third month of pregnancy the decidua is more than a quarter of an inch in thickness.

It has been previously indicated that the penetration of the decidua by the ovum divides the former into decidua basalis, capsularis, marginalis and vera. The decidua capsularis at first forms a prominence into the uterine cavity covering the growing ovum, but by the end of the third month of pregnancy this abuts on to the decidua lining the opposite wall of the uterus, the decidua capsularis fusing with the opposed decidua vera and the uterine cavity thus becoming obliterated.

The theories regarding the origin of the decidual cells are considered by Lochhead and may be tabulated thus:—

(1) Langhans and Hennig held that they were modified leucocytes, but failed to prove this.

(2) Overlach and Frommel thought they were modified glandular cells.

(3) Ercolani was of opinion that the developing ovum first completely destroyed the mucosa, and that subsequently the decidua was formed from the endothelium of the vessel walls.

(4) Creighton, in 1878, was the first to maintain that they were derived from the interglandular tissue of the mucosa which consists of connective tissue of an embryonic type and so allows of a rapid transformation of its cellular elements. This view was supported later by Minot, Hart, Gulland, Peters and others, and is the view generally accepted to-day. Since then Hitschmann and Adler have confirmed these findings, and have shown that the uterine mucosa is in a state of continual structural change throughout the whole menstrual cycle.

In the superficial layers the structures mainly affected in the decidual changes are the interglandular tissues which hypertrophy and become almost completely filled with decidual cells and blood vessels, the lumina of the glands becoming more or less compressed

so that this part of the decidua has a firm, compact appearance and is known as the decidua compacta. In the deeper layers the gland lumina are greatly dilated and lined with cubical or flattened epithelium; the interglandular material is relatively scanty in amount and does not show so great a transformation into decidual cells. The deeper part is thus of a more open spongy appearance and is known as the decidua spongiosa. It is only to the deepest strata of the compact layer that the chorionic villi penetrate during implantation of the ovum.

No change is seen in that part of the fundi of the glands situated in the muscular coat of the uterus; it is from these remnants that the whole mucous membrane of the uterus is replaced post partum.

The nature of the decidual formation was for long thought to be a reaction on the part of the mucosa to the presence of an impregnated ovum. But as a uterine decidua is formed in cases of ectopic gestation it is clear that some other explanation is necessary. It may be said that decidual formation constitutes a reaction on the part of the uterine mucosa to the condition of pregnancy, but much more than this is not known. The most recent work by Bom and Loëb goes to show that the internal secretion of the corpus luteum is of importance in this respect; according to Loëb this secretion has a sensitizing action on the uterus; he attributes the structural changes of the pre-menstrual and menstrual periods to a reaction to this secretion which, however, in the absence of pregnancy passes off. But in pregnancy when the corpus luteum persists this reaction also persists and increases and represents decidual formation. While, according to this view, decidual formation would appear to be mainly dependent on the internal secretion of the corpus luteum it is evident that mechanical stimulation (the presence of the impregnated ovum) also plays a part, if even a subsidiary part, because if the non-pregnant uterine mucosa be mechanically irritated during the time of existence of a corpus luteum, a decidual reaction is produced which, however, soons disappears when the irritant ceases to act (Loeb). This point will be referred to again.

The functions of the decidua may be summarized as:—(1) To synthesize and store glycogen as a supply of carbohydrate for the embryo. This was first pointed out by Marchand and was shown by Driesser to occur mainly in the glandular epithelium of the decidua spongiosa. This function, while observed mainly in rodents, is present also in man, but it is exercised only in the early months and ceases presumably when the fœtus has advanced in development sufficiently to store its own carbohydrate.

(2) Fat globules have been found at a period of gestation prior to that at which fatty degeneration would be expected, and on this.

account the decidua has been looked on as an important source of fat for the fœtus.

(3) A provision against a too intense penetration of the ovum; Turner first pointed this out, and many subsequent observers have produced facts to support it, especially Webster, Bryce and Teacher. The latter authorities state that decidual formation controls trophoblastic activity until such time as placentation is complete. Young supports this view and regards decidual formation as localizing the hæmorrhage and œdema to that part of the mucosa immediately surrounding the embedded ovum. He is of opinion that the physical changes in decidual formation are due entirely to imbibition of fluid by the mucosa.

(4) A source of nourishment for the ovum. It has been pointed out that prior to trophoblastic formation the ovum finds alimentary pabulum in the degenerating decidual tissue round it, and Pfannenstiel held that decidual cells are merely degenerate forms of connective tissue cells and are of use only as pabulum to be absorbed by the ovum. While the decidua may be safely regarded as nutritive in the very earliest stages of pregnancy, this function is soon abandoned for the protective when the trophoblast develops.

Vascularization of the Placenta.

While, in the early stages, sufficient nutrition for the developing ovum can be obtained from the maternal blood in the intervillous spaces by the chorionic epithelium, by the end of the third week such a mechanism is insufficient to provide for the needs of the embryo, and a further mechanism has to be elaborated. This consists of a process of vascularization of the chorion and the formation of a connexion between the chorionic and embryonic vessels. This represents the final stage of fœtal nutrition and the most elaborate. Most authorities, in their descriptions, avoid details regarding the earlier stages of this process; only in embryological works is any attempt made to describe the earliest stages of the process, which is as follows:—

About the third or fourth week blood vessels are present in the mesoderm of the chorionic membrane and are carried into the villous cores where they proceed to function as the agents of embryonic and fœtal assimilation and excretion. At this time the ventral stalk is a very short structure, and the consideration that arises is whether these vessels are formed simultaneously in embryo and chorion and link up with each other to form a complete cardiovascular system, or whether the vessels are formed primarily in connexion with the embryo and grow along the ventral stalk to reach and vascularize the chorion.

The first vessels formed are in the mesoderm on the lower

surface of the yolk sac where groups of nucleated corpuscles closely packed together—the blood islands of Pander—appear. The peripheral cells become the endothelium of the vessel walls while the central mass becomes the primitive nucleated red blood corpuscles. Cellular processes unite the various islands together and, becoming hollowed, produce a vascular network. This network extends over the sac and joins with a similar system that has been formed in the body stalk and chorion as an extension of the allantoic vessels. Bremer is of opinion that the earliest blood vessels arise separately in the yolk sac and body stalk by multiple foci of origin and that in the latter situation they take origin in funnel-shaped ingrowths of surface subepithelial tissue. Robinson says: "The first formed villi are non-vascular, but by the time the secondary villi have developed the umbilical arteries have grown through the body-stalk (allantoic stalk) into the mesoderm of the chorion, and branches from them enter into the mesodermal cores of the villi, which thus become vascular." Formed in this way by the fourth week the vessels penetrate into the mesodermal cores of the villi and soon extend to the extremities of the villi, a state of affairs which persists until birth.

So far the villi described have consisted of single stems; now these stems branch again and again, and thus the villi become progressively longer with compound branches, and the appearance presented is that of an inverted clump of trees. The object of this branching is to increase the area of villous surface available for absorption. As a result of the invasion of the villous stems by the chorionic mesoderm the trophoblast becomes spread over the surface so that on section a central myxomatous mesoblastic core is seen with a small vessel or two in it, covered by a layer or two of Langhans' cells outside of which is a layer of syncytium usually showing only one layer of nuclei.

Further, as pregnancy advances, structural changes are seen in the villous epithelium. From about the 18th week onward the Langhans' cells begin to disappear, and with the progressive expansion of the surface of the villi due to arborization the syncytial layer becomes thinned out, so that from the 20th week a villus consists of a core of embryonic mesoderm containing blood vessels and covered by a thin layer of syncytium.

Lochhead explains this occurrence by pointing out that, in the earliest weeks of gestation, the various embryonic organs are not sufficiently differentiated to be able to carry out their respective functions, and that the Langhans' cells act for them by selecting carefully the substances to be allowed to enter the fœtal circulation. Later the organs are able to select for themselves and the Langhans' cells, therefore, disappear, being of no further use.

The intervillous spaces now become very complex, and it will be appreciated that the maternal blood circulating sluggishly through this space comes in contact with a very large compound chorionic surface so that ample opportunity will be afforded for a complete interchange of substances between the two circulations which, however, are always separated by the fœtal vessel walls, mesoderm of the villi and villous epithelium.

Villi are of two kinds: (1) those that extend from the chorionic plate to the decidual attachment—fastening villi—or (2) those that hang free in the intervillous blood space—absorbing villi. Again the lateral branches of the fastening villi may hang free in the space or be attached to the decidua.

Decidual Attachment.

Where villi are attached to the decidua the chorionic epithelium is not usually reduced to the thin layer, as described, but forms a thick mass of cells and syncytium at the attached tips of the villi, which mass penetrates into the decidua. These are known as *cell columns*, and are, therefore, villous remains into which the mesoderm has not, so far, penetrated. On this account the attachment of the ovum to the decidua is loose during the first six weeks and, as Hitschmann and Lindenthal point out, complete separation of the ovum at this stage is easy. These cell columns are mainly responsible for the penetration and splitting of the decidua. They are long when first formed but continually diminish until by the eighth or ninth week they have become invaded by mesoderm and the attachment of the ovum is much firmer, so that separation now necessitates removal of decidual tissue with the ovum.

Cell islands are likewise masses of apical trophoblast into which the mesodermal stroma has not penetrated; they differ from the cell columns by lying free in the intervillous spaces, and therefore cap absorbing villi and not anchoring villi. The cells are large and swollen and, especially when cut across, in section, and seen apart from the parent villi resemble masses of decidual cells, but true decidual masses are not seen in the intervillous spaces.

Webster maintained that these cell islands may contain decidual tissue, but other observers have not confirmed this. These islands, like the cell columns, disappear by the tenth week and are mostly converted into fibrinoid material.

The basal ectoderm is that portion of the trophoblast which spreads out from the decidual attachment of the villi and covers the surface of the decidua. It, therefore, forms the outer wall of the intervillous space. It will be seen, then, that the intervillous space is lined on every aspect by trophoblast and is filled with

maternal blood, so that Duval's definition of the placenta as "a maternal hæmorrhage encysted by fœtal ectodermal elements" is essentially true. The basal ectoderm may form a single or a stratified layer and persists until the end of pregnancy, either as a continuous layer or as groups of cells; it is composed partly of syncytium and partly of Langhans' cells and, lying on the surface of the decidua, may closely resemble this tissue, so that its presence is often overlooked and it is regarded as decidual tissue. From the latter it is distinguished thus by Frassi: "The nuclei of these elements are larger and take the stain more deeply and regularly (than decidual cells). With strong magnifications a distinct difference can be perceived between the endonuclear substance in such cells and that of the decidual cells." It is to be noted that, whereas transitions in form between these cells and syncytial tissue may be seen, so proving their fœtal origin, a similar transition into decidual substance is never found.

It will be seen then, that the decidua forming the lining of the implantation cavity is everywhere invaded by trophoblastic cells so that the ovum becomes finally fixed in its bed.

Transition zone. This is the name given to that plane of the decidua where fœtal and maternal tissues meet, where the penetration of the trophoblast is finally held up and where the decidua prevents any further penetration by the invader. At first the trophoblast stems seem to penetrate almost unchecked, and at this stage decidual formation is imperfect. Later, when the decidua is more fully formed, this invasion becomes resisted, and it was the observation of this fact that led Turner and others to the conclusion that the main function of the decidua was protective; proof of this is found in tubal gestation in which decidual formation is very imperfect in the tube and the chorionic villi penetrate much more deeply than in the uterus. Of this Johnstone says: "It is, in truth, the fighting line where the conflict between the maternal cells and the invading trophoderm takes place, and it is strewn with such of the dead of both sides as have not already been carried off the field or otherwise disposed of."

In the Bryce-Teacher ovum the surface of the decidua surrounding the implantation cavity is markedly necrosed forming a "hyaline, darkly-staining, and nearly nuclear-free zone." In Jung's ovum there was a similarly described layer which was, however, thickly infiltrated with red and white blood corpuscles.

In Young's ovum (1911) the condition is similar, and he traces the changes in the individual cells participating. The cells in the transition zone, especially their cytoplasm, first become markedly swollen and stain deeply with eosin, exhibiting a granular appearance, "or, in some cases, a curious character resembling . . . opaque

glass." In places the inner surface of the necrotic zone is ragged and looks as though it was being broken off in fragments into the implantation cavity. Vacuolation is prominent in this degenerating area. In Johnstone's ovum (1914) the border zone consists of œdematous, degenerated tissue. Streaks of fibrinoid material are seen in this area.

The transition or border zone may thus be defined as a zone of degenerated decidual tissue of indefinite extent interposed between the fœtal trophoblast on the one hand and the normal decidua on the other. In any individual specimen it may be difficult to define the zone exactly, and certain authors have described what they consider to be its physical characteristics; thus Frassi and Jung state that a leucocytic zone around the ovum is indicative of this area, as the leucocytes cannot pass beyond the barrier of the trophoblast, but other observers have found such leucocytic infiltration of the decidua too generalized to be of value in this respect.

The term " detritus zone," employed by Bonnet, would appear to be a more appropriate name. He described in this area symplasma formations—areas of coagulation necrosis—of the decidual cells and enlarged glands in whose lumina are seen secretion, blood and leucocytes.

In this connexion the *third layer* may be discussed. It has been thought by some to represent a definite layer of cells between the two layers of trophoblast and the decidua. Hubrecht gave the name " deciduo-fracts " to a layer of giant cells which he described in the decidua of the mouse and hedgehog. They appear in the earliest days of gestation tissue phagocytic, showing absorbed red blood corpuscles and decidual tissue in their interiors. He regarded them as a means of enlarging the implantation cavity.

It is of little use going into details regarding the various views of the origin of the third layer whether the cells be fœtal (Duval, Sabotta)—decidual (Kolster, Disse)—or partly fœtal and partly decidual (Jenkinson)—the important point is that all authors regard them as phagocytes whose function is to erode, absorb and digest the surrounding decidual tissue and so enlarge the implantation cavity. Their life history is short and they soon die and disappear. In the human ovum Bryce and Teacher have described somewhat similar cells lying within the necrotic layer of the decidua; these cells were partly degenerated and, on account of their staining reactions and inability to trace them to connexion with trophoblast these investigators regard them as maternal in origin.

Peters and some other observers have described other cells, but in man, as Lochhead points out, although these cells would appear to be producing a layer of coagulation necrosis—a symplasma—round the trophoblast, yet they show no signs of ingestion of

decidual tissue or blood cells. From this it would appear doubtful whether cells described by Peters are the same as the deciduofracts in the hedgehog and mouse, but even if they should be similar they soon disappear.

The formation of fibrin can usefully be considered here. Fibrin formation is a degenerative change which occurs in the decidua basalis and capsularis, but not to any great degree in the vera. Attention was first drawn to it by Nitabuch and the subject has since been studied by many others.

Fibrin may be found in four situations: (1) as a layer at some distance from the surface of the implantation cavity, most commonly in the basalis but also often in the decidua capsularis. It was in this area that Nitabuch first described it. The time of appearance is uncertain, but Webster has demonstrated its presence as early as the fourth week in the basalis and earlier in the capsularis.

(2) Not so constantly a fibrin layer is found in placentæ up to the third month immediately in the wall of the intervillous space. This was first figured by Rohr and is called Rohr's stria, or the upper stria, Nitabuch's being the lower stria.

(3) Close beneath the chorionic membrane is constantly found in the second half of pregnancy another layer of fibrin—Langhans' stria. Layers of canalized fibrin are also found here.

(4) Everywhere, and especially in the intervillous spaces, striæ of fibrin are laid down in the second half of pregnancy; they may be seen as small or large flakes attached to one side of a villus, or they may form large masses, in the interior of which several more or less degenerated villi are seen. If these masses are small but just visible to the naked eye they are spoken of as *fibrin nodes*, but if larger they are called *white infarctions*. They will be referred to again.

Fibrin formation is a sign of degeneration, and it will be seen that degeneration of the placenta is thus started by the fourth week. As pregnancy advances the various layers of fibrin enumerated are laid down to an increasing degree; thus, while preparations are made in advance for the nutrition of the embryo, preparations are likewise made long in advance for the termination of that nutrition. Regarding the staining properties of fibrin Grosser quotes Hitschmann and Lindenthal that the typical fibrin reaction is shown only at its earliest formation, and that later on this is absent; on this account he suggests the alternative name of *fibrinoid substance*. In the earlier months and before the change has become widespread Nitabuch's striæ are regarded as the boundary between the fœtal and maternal tissues; although here and there some decidual masses may be seen superficial to it, in general this view holds.

Another point is that leucocytosis in the decidua does not

penetrate beyond the striæ. Degenerative changes are held to be responsible for the formation of fibrin; but degeneration of what? Langhans and Nitabuch held that decidual degeneration, probably as the result of contact with the trophoblast of the villi, was responsible for the appearance of the Nitabuch striæ. But much fibrin is formed round the villi and beneath the chorionic membrane, situations in which decidua is absent; so that the trophoblast would appear to be the source in these sites. Again ordinary blood fibrin (maternal), shown by the presence of red and white corpuscles in the masses, may appear, and thus a third possible source is indicated. This is probably the source of the subchorial (Langhans) fibrin, as the structure here is in layers as though successively deposited, especially as the blood flow would appear to be greatly retarded in the roof of the intervillous space.

In the villi fibrin starts to be deposited partly on the surface where and when the syncytium has almost disappeared, and also between the syncytial covering and the stroma of the villi, pointing to the former being the seat of origin. Langhans' cells often persist long in these fibrin masses and may stand out prominently as an almost complete row of cells; but finally they disappear and are, themselves, converted into fibrin. This has been likened to the process by which "cells, and even whole cell territories become transformed into matrix in some kinds of cartilage" (Grosser).

With the syncytium transformed into fibrin one of its great functions—the prevention of coagulation in maternal blood—is lost, and hence the original fibrin mass is added to by ordinary fibrin deposited from blood coagulating on its surface.

By this process a number—it may be a great number—of villi become bound together in fibrinoid material and later the stroma of the villi undergoes hyaline transformation, so that here and there in the dark masses of fibrin lighter staining areas are seen representing the original villi. Later still these become mere ghosts, and finally are completely transformed into fibrinoid material.

In the chorionic membrane the changes are seen by the fourth month; a partial change, as described above, is present by the sixth month, and the trophoblast in the centre of the placenta is replaced by the fibrin striæ. Blood coagulation in layers is thus induced by the factors mentioned and masses of canalized fibrin result.

The cell islands mentioned above are an important early source of fibrin, and it is thought that they may give a stimulus for the formation of the larger masses. In the centre of some of the larger fibrin masses liquefaction may occur, and so *placental cysts* are produced; they are normal structures, usually very small, and

present in mature placentæ, showing on section or through the amniotic surface. Such cysts have been studied by Giese, who found a lining of flattened endothelium-like cells, derived from trophoblast, surrounded by masses of fibrin in which ghosts of chorionic villi are seen.

In infarct-formation it is important to remember that the first event is fibrin-formation round the villi; degeneration is secondary to this as the villi are thus cut off from their source of nourishment —the maternal blood in the intervillous space. The idea of Ackermann and some others that degeneration of the villi is the primary occurrence is wrong; the villi are nourished by the maternal blood and the villous (fœtal) circulation is entirely for the purpose of effecting blood interchange just as is the pulmonary circulation in the adult.

A great deal of discussion has raged round the origin of these so-called placental infarctions. Their presence has long been noticed in a large proportion of placentæ; indeed Williams, investigating 500 consecutive placentæ, found naked-eye infarcts in 63 per cent., while minute fibrin nodes were present in every case.

Eden, Williams and Ackermann are of opinion that the primary factor is an endarteritic process in the arteries of the villi; by this the nutrition of the peripheral villi is interfered with allowing fibrin to be deposited, first just beneath the syncytium, and secondly on the surface. With this deposition occurring at various foci it is easy to imagine that numbers of villi may become glued together in masses of fibrin and undergo final degeneration. Looked at in this way the term " infarction " is justified. Williams and Eden insist that this is a normal condition in the placenta and indicates a senile change in the organ. From this it would appear, however, that the nutrition of the villi is through the chorionic vessels; a little consideration will show that such is not the case, and Young in 1914 convincingly marshalled the facts to prove that it is the maternal blood in the intervillous spaces that nourishes the villi.

Young is of opinion that the white infarctions are the end results of red infarctions caused by the retro-placental hæmorrhages. Williams admits that one type of infarction, characterized by vascular dilatation and clumping of the villi, may be due to such a mechanism, but while the writer has evidence to show that a number of placental hæmorrhages do end as white infarcts it cannot reasonably be claimed that such is the usual method of production in view of the frequency of these fibrinoid deposits. Clemenz, in 1922, could not detect the endarteritis described by Williams and others, and concluded that the main factor is a clotting of maternal blood in the intervillous spaces which is initiated by fibrin deposits upon villi with local epithelial defects, and is aided by the slowness of

the blood stream in the placental circulation. This would appear to be the most reasonable explanation as it meets all the facts of the case. Most investigators will agree with the dissatisfaction of Clemenz with the term "infarction." He suggests in its place the better name of "white necrosis of the placenta."

Talbot in 1921 put forward the view that infarct formation was a sign of some hidden sepsis, but his paper is unconvincing.

As we know that the villi are nourished by intervillous blood it is obvious that the cause of so widespread degeneration must be looked for in some interference with the maternal circulation, and on this account it seems that the views of Clemenz are the most satisfactory. Usually the presence of these necrotic patches makes no difference to mother or child, showing that placental tissue is formed in an amount beyond the actual requirements of the fœtus; but when the change is very extensive it is probable that fœtal death may be caused by ablation of a sufficiently large area of placenta.

In this connection we may discuss the *subchorial closing ring*. This is a plate of cells of varying thickness which forms a rim at the placental margin. It is not always present and is often incomplete; it lies between the fibrous tissue of the chorionic membrane and the overlying fibrinoid material (Langhans), laterally it passes insensibly into the epithelial layers of the chorion læve. It is composed of cells which, towards the centre of the chorionic membrane, form a single layer, and peripherally often several layers; it represents one of the situations in which the Langhans' layer has persisted until the end of pregnancy.

Winkler described a continuous layer of cells lying beneath the connective tissue of the chorionic membrane; he called this the closing plate and supposed that it was derived from the decidua.

Pfannenstiel supposed that this was produced by the undermining of the decidua marginalis by the marginal villi. Much discussion has centred round the origin of this plate into which it is not our purpose to go; suffice it to say that the modern conception is that the closing ring is formed as described above by trophoblastic cells, and that any supposed derivation from decidua is due to a wrong interpretation of the appearance of the cells. A number of text-books describe and figure this structure as a separate process of decidua—the subchorionic decidua—but this is opposed to the modern conception of the intervillous space being limited in every direction by fœtal trophoblast.

Formation of the Placenta.

So far the chorionic villi have been described as entirely surrounding the ovum—a condition well shown in the Bryce-Teacher, Peters and Leopold ova—bathed in maternal blood

in the lacunæ. Between the villi and decidua basalis the attachment is intimate, but between the villi and decidua capsularis it is never so intimate, and penetration and attachment of the villi is not so definite as in the case of the decidua basalis. As pregnancy goes on the ovum grows and protrudes more and more into the uterine cavity and the decidua capsularis becomes stretched more and more over the surface of the ovum; also, on account of the stretching, the blood supply to the decidua capsularis and to the related intervillous spaces is interfered with and increasingly limited. From both these causes the nutrition of the villi in relation to the capsularis is interfered with and they begin to atrophy. In a four weeks' ovum a spot bare of villi has been seen at the summit of the decidua capsularis (decidual pole) (Pfannenstiel), and even at the second week early signs of atrophy have been noted. To compensate for this loss of nutritional surface the villi connected with the decidua basalis continue to branch and to grow in length while becoming correspondingly thinner; by these means a relatively increasing surface area is exposed to the maternal blood in the intervillous spaces and so an increased blood exchange occurs between the two circulations.

Thus with the villi atrophying at one region and undergoing hypertrophy in another the chorion ceases to present the generalized shaggy appearance of the early ovum, and becomes smoother—chorion læve—all over except where it is related to the decidua basalis—chorion frondosum. Microscopically, degeneration is very evident in the chorion læve. The epithelium of the villi disappears and hyaline degeneration occurs in their stroma, and between these hyaline masses the remains of cells and leucocytes are seen. At the decidual pole even these hyaline villi vanish, but they persist in the neighbourhood of the placenta. The epithelium of the chorionic membrane is, however, usually recognizable even at maturity, and extending to it is a zone of detritus containing the remains of the villi, the capsularis and the compact layer of the apposed decidua vera in which also some degeneration has occurred. The process is a gradual one and is established by about the ninth week, being first seen towards the capsular pole of the chorion; it is completed by the twelfth week when the hypertrophied villi are now limited to a circular area on the chorion related to the decidua basalis—the discoid placental area. This area is about one-fourth of the area of the uterine wall, and this ratio is maintained more or less up to the end of pregnancy.

Several considerations arise out of these facts. What are the factors which arrange the disposition of the contents of the ovum so that the body stalk, the future umbilical cord which connects the embryo is in practically every case with that part of the chorion

which is related to the decidua basalis? Again, in the event of the usual mechanism becoming disarranged and the umbilical stalk becoming fixed in relation to the decidua capsularis with the consequent formation of the placenta there, would the insufficiency of blood supply then lead to death of the ovum and early abortion? Or would a sufficient blood supply be determined in these circumstances to tide the ovum over until it had gained an attachment to the decidua vera and opposite uterine wall where it might develope? Further, if such a state of affairs would cause the ovum to perish would it not be possible for a certain proportion of early abortions of unknown cause to be due to this? To these questions there is at present no answer, and future work can alone solve the riddle.

Fate of the Decidua.

The progressive and degenerative changes already described in the decidua occur mainly in the basalis. Fibrinoid formation, for instance, does not occur in the decidua vera, and it would appear from this that fibrin is deposited only where fœtal and maternal elements meet. In general terms it may be said that after the third month, as pregnancy advances, the decidua degenerates until at term it constitutes only a thin and irregular membrane easily cast off.

The decidua vera is of the same general structure as previously described showing a superficial compact and a deep spongy layer. After the fourth month the decidual cells of the compact layer lose their polygonal or rounded appearance, become smaller and more spindle-shaped and arranged in a direction parallel with the surface of the uterus. In the spongy layer the epithelial papillæ disappear and the gland cavities now lose their irregular and open appearance and become low and broader in shape. This, as well as the flattening of the cells of the compact layer, is due to the progressive enlargement and stretching of the uterine wall. The epithelial cells lining the glands, at first columnar, become cubical and later flattened like endothelium, and these finally are seen to be absent in places. The glands thus come to resemble small elongated clefts like empty venous or lymphatic spaces. These changes cease in the deepest layers where muscle fibres are seen; here the glands retain a more or less normal appearance and form the elements of regeneration of the entire mucosa.

The surface epithelium soon becomes flattened with the expansion of the uterine cavity, and the cilia are lost; according to Marchand fatty degeneration occurs, but this is denied by Grosser, who says "the fatty degeneration of the decidua parietalis, which was formerly regarded as the rule, occurs at most only in exceptional circumstances." By the end of the third month,—*i.e.*, at the

time of the obliteration of the decidual space by the fusion of the decidua capsularis and vera—the epithelium has degenerated and disappeared.

Decidua basalis. This has not the compact and spongy layers so well marked as the decidua vera. The impregnated ovum penetrates to the depths of the compact layer of the decidua or to the junction of that and the spongy layer; so that the only part, if any, of the compact layer in the decidua basalis is a very thin layer of tissue deep to the level of penetration. This point appears to be forgotten in a number of the published descriptions of the decidua basalis.

What remains of the compact layer forms the decidual or basal plate which closes the intervillous space towards the uterine sid· As in the case of the vera the decidual cells become more fusiform towards the end of pregnancy. Here are seen the fibrin striæ already described, also the remains of the trophoblast which originally formed the basal ectoderm and the cell columns of the anchoring villi. The trophoblastic remains may be either syncytial masses or large mononuclear cells similar to those found in connexion with fibrin formation. The point is that, especially in the later stages, these cells may be found beyond the Nitabuch fibrin striæ (see discussion *re* border zone). The terminations of the anchoring villi have, later on, lost their epithelial—trophoblastic—covering, and their tips in many cases end by dipping into fibrinoid masses while degeneration in varying degrees is seen in the stroma.

The decidual pillars are elevations of the compact layer of the decidua basalis which have escaped the eroding action of the early trophoblast; they extend to a varying degree into the intervillous spaces and towards the chorionic membrane. In some sections they appear to be separate from the basal plate, and on this account Leopold applied the name "decidual islands" to them; but in serial sections they can be traced directly to the basal plate.

These pillars, or placental septa, in later months divide the placenta into cotyledons, an appearance not found in early placentæ. The septa extend only partly towards the chorionic membrane. In the mature placenta the decidual cells in these septa have almost always degenerated and sometimes have disappeared entirely, so that only an open meshwork is seen in which are patches of fibrinoid material; into these the anchoring villi penetrate so that the appearance presented may be very confusing. It is on this account that much discussion has arisen as to the origin of these pillars; Whitridge Williams, for instance, says that the decidual conception of their origin is erroneous: ". . . . most of them represent masses of trophoblast into which the chorionic connective tissue has not grown, and which therefore have not

developed into typical villi." While the matter cannot be considered as settled the present inclination is to regard them as decidual.

The spongy layer is of similar appearance to that of the decidua vera, but is not so thick in this situation, and gland spaces are not so prominent on account of the degeneration of the walls of some of them which have been filled with blood in the early stages of development; between the gland spaces are seen occasional detached fragments of syncytium—syncytial giant cells—which have been detached and have penetrated deeply.

The decidua capsularis early shows degenerative changes. The aperture of penetration becomes closed either by inward growth of the margins or by organization of the closing coagulum after the protruding portion is cast off.

In Frassi's ovum the decidua capsularis is a smooth even layer and, as would be expected, glands are present at the margins but not towards the pole. Streaks of fibrin have started to appear and are most evident at the summit. But no trace is found of the implantation opening in the later stages of development of the placenta; in this area a tissue rich in fibrin and poor in cells is found which is called Reichert's scar; this denotes either the complete organic closure of the capsularis or, more probably, the first stages of degeneration. As pregnancy advances the decidua capsularis becomes more and more stretched, exsanguinated and correspondingly degenerated, and by the end of the third month its remains fuse with the decidua vera covering the remainder of the uterine cavity. Some hold that traces of the decidua capsularis can be found up to term, while others maintain that it entirely disappears and that the atrophied remains of the villi of the chorion læve, which have come into apposition with the decidua vera, have been erroneously regarded as decidua capsularis. Grosser shows extensive atrophic changes in the decidua capsularis over the region of the internal os where there can be no contact with the decidua vera and argues from this that complete atrophy occurs.

It is a point almost impossible of proof either way as the decidua capsularis consists entirely of a compact layer which will become apposed to the superficial surface of the compact layer of the decidua vera; further both these layers are degenerated, stretched and atrophied in varying degrees and with the surface and glandular epithelium lost their junction would be impossible to trace.

Decidual vascularization is effected by the ultimate branches of the uterine arteries. While these penetrate and feed both the deciduæ vera and basalis the supply, and therefore the number of

vessels and the degree of their dilatation, is much greater in the latter than in the former.

It has previously been pointed out that in decidual formation in general the arterioles become enlarged, dilated and convoluted. In passing through the spongy layers of the decidua basalis these characters are seen, but when the vessels reach the basal plate the muscular coat becomes lost and they then become merely endothelial-lined dilated blood channels as was first pointed out by Webster; according to some observers even the endothelium is lost when the fibrin layers are reached, so that it is an easy matter for these dilated vascular channels to open into the intervillous spaces.

The supplying vessels are said to open mostly in the region of the placental septa, while the draining vessels take origin towards the middle of the cotyledon. The mouths of these supplying and draining vessels are easily seen in sections and are figured by all authors; they are funnel-shaped and open obliquely on the surface, and in some cases are blocked by syncytial masses. Veit first demonstrated this and showed how such chorionic elements were continually entering the circulation and could be demonstrated in the blood strata at distant parts. He based his theory of toxæmia of pregnancy on this fact, and, later still, Abderhalden founded his blood test for pregnancy on it.

The chorio decidual vessels, first described by Ruge, are not to be confused with the vessels just described. They are relatively large and may be visible macroscopically. They pass out from the anchoring villi where the epithelium is lost at the apex and either terminate in the basal plate or enter the stem of a villus ascending from the basal plate. The epithelium and some of the stroma of the villi have degenerated, but the vessels have persisted and have become engorged and dilated.

Ruge believed that the presence of these vessels indicated a vascularization of the decidua by fœtal vessels. *It is to be emphasized, however, that this does not indicate any anastomosis between the fœtal and maternal circulation; such does not, in any circumstances, exist.*

The Microscopic Structure of the Amnion.

The microscopic structure of the amnion has been described by several observers, especially Webster. At the fourth week of gestation the lining ectoderm cells are flattened and almost like an endothelium; the lines of division between the cells are usually indistinct, and here and there absent, so that a syncytium-like formation is produced. The nuclei are round or oval and may be in more than one row. The mesoblast varies in thickness; its outer

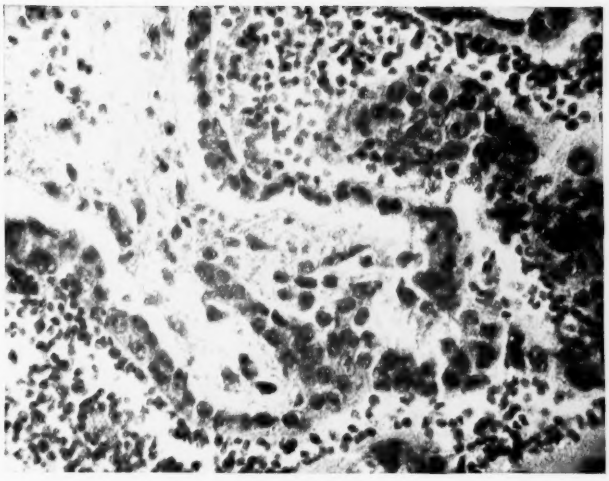

Fig. 1. High power photomicrograph of Johnstone's ovum (30 days) to show a branching villus covered with two layers of trophoblastic epithelium, and with a fibrocellular core of embryonic mesoderm which has retracted slightly during preparation.

(By kind permission of Dr. R. W. Johnstone.)

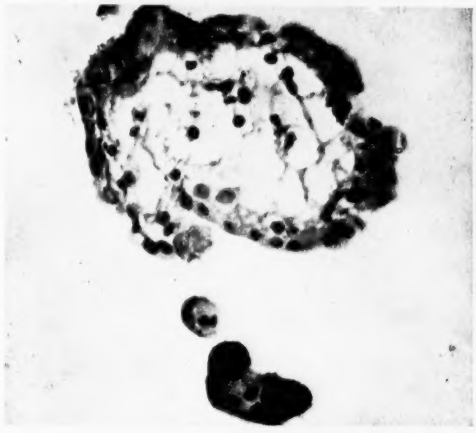

Fig. 2. High power photomicrograph (untouched) of a villus from a four weeks ovum. The syncytial covering, the underlying layer of Langhans' cells and the mesodermal core are all seen. In the lower part is seen a section through a syncytial bud—a syncytial giant cell.

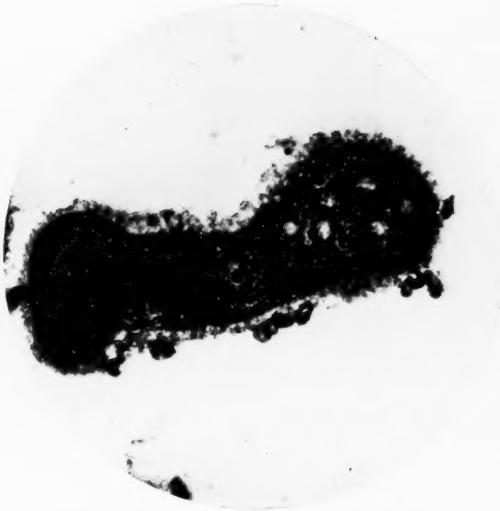

Fig. 3. Striated border of the syncytium. On the lower edge several adherent blood corpuscles may be seen.
(This illustration is kindly lent by Dr. R. W. Johnstone.)

Fig. 4. Low power photomicrograph of the villi of a six weeks ovum. The double layer of covering trophoblast, the cellular core of mesoblast which now contains blood vessels, and some syncytial giant cells are shown.

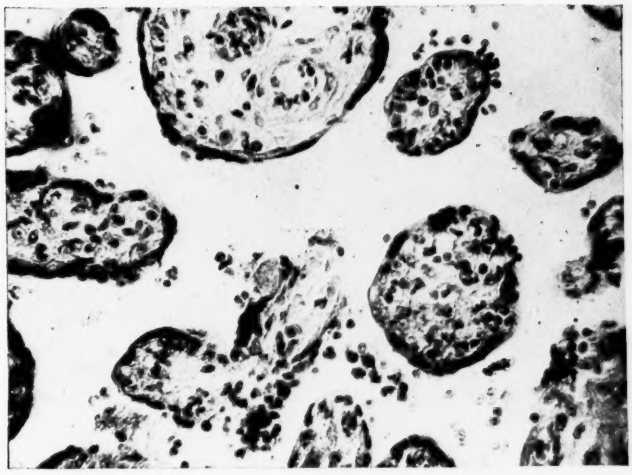

Fig. 5. Photomicrograph of a full term placenta. The trophoblast is now reduced to a single layer of syncytium : well-formed blood vessels are present in a stem villi : while some maternal blood corpuscles are present in the intervillous space.

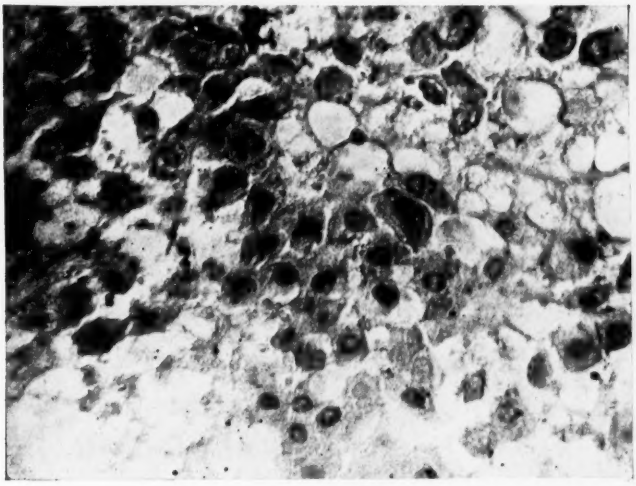

Fig. 6. The decidua vera compacta at the eighth week. The decidual cells are polygonal and closely packed, while the cell outlines and villi are vague.

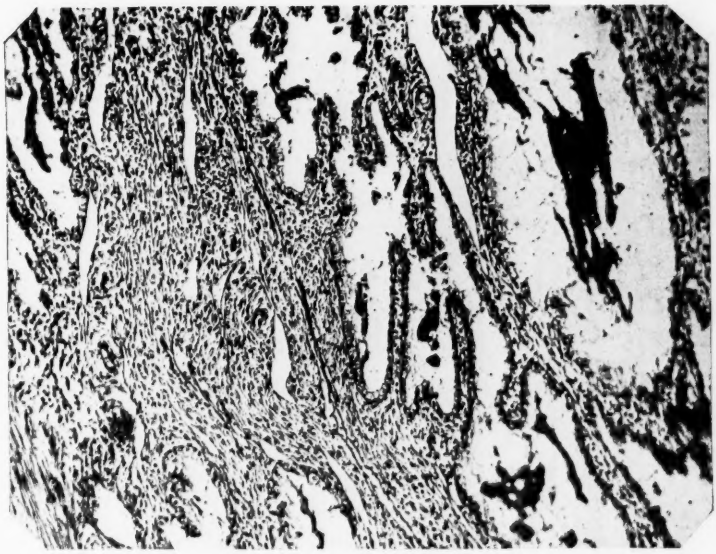

Fig. 7. The decidua spongiosa in a two months ovum. The glandular spaces are greatly dilated and are starting to be drawn out. Papilliform projections into the gland lumina are seen.

Fig. 8. Photomicrograph of a white "infarction" of the mature placenta. The villi are seen as lighter areas in varying stages of degeneration in the darker mass of fibrinoid material which glues them together. In the lower part of the field several unaltered villi are seen.

layer is called the mesothelium and resembles the epiblast in appearance; the inner layer next the amniotic epiblast is fibrilliated and contains but few cells, and is thought to be formed from the mesothelium.

As pregnancy advances the epithelial cells increase in number and may form more than one layer; they become of cubical or even, in some places, columnar appearance in the latter half of pregnancy, and as gestation proceeds the cells become mainly columnar with the nuclei distant from the basement membrane. The lines of separation between the adjacent cells remain dim. The edges of the cells are irregular and the adjacent projections blend so as to form bridges between the cells, thus producing a "prickle" appearance.

Stomata between the cells have been described, especially by Hüter and Winckler, but Lange believes that such "stomata" are merely lacunæ formed by the breaking down of degenerating cells, and Bondi could not find any stomata.

Apart from such stomata it is quite possible that minute openings may exist between adjacent cells for the passage of fluids. Lonnberg, in 1901, found fat granules of frequent occurrence in the epithelial cells; granules appear in the cells after the third month, and Bondi found such granules at term. They stain with neutral red, but he could not assign a function to them.

Now and again, especially at the placental margin, the epithelium becomes many-layered in places with cornification and desquamation of the superficial layers forming the amniotic villi or caruncles described by Ahlfeld.

The mesothelium degenerates, this process starting in the second month and being well advanced by the sixth. The loose tissue formed by the mesothelium and lying between it and the epiblast increases in amount, but contains few cells, and in the later months of pregnancy it is of a mucoid appearance. The connection between this mesoblast and the chorionic mesoblast is by fine threads only.

There are no blood vessels in the amnion, and this may explain the lack of organic union between that membrane and the chorion.

The Fixation of the Placenta.

The fixation of the placenta is by the attachment of the anchoring villi. When the ovum is tiny the tendency to separation is slight on account of its light weight, but it has been shown that up to the end of the second month of gestation this attachment is not firm; after that, however, the villi penetrate further and as the covering epithelium is lost in many, the stroma of the villi comes into contact with the decidua so that the junction is more firm. Again by the

end of the third month the expanding ovum reaches to the opposite uterine wall and there gains an attachment by the fusion of the decidua capsularis and vera while the chorionic villi atrophy except in the part apposed to the decidua basalis. Thus a fresh attachment being formed for the ovum a certain amount of strain is taken off the placental attachment and so the likelihood of separation is further diminished. Further, amniotic fluid becomes secreted from the earliest weeks and increases rapidly in amount, so that the placenta is finally kept in position not only by the grip of its own tentacles but also by the intrauterine fluid pressure, which is augmented by the painless uterine contractions of pregnancy, pressing it against the uterine wall.

During the second stage of labour the uterine contractions and retraction may cause some disproportion in size between the placenta and its uterine site, but this disproportion is small in amount as the uterus is still occupied by the fœtus and the major part of the liquor amnii; in the third stage, however, these factors no longer exist to assist in maintaining the placenta in position, the uterus is free to retract strongly, the disproportion between the placenta and its site becomes greatly increased, and as the placenta and membranes cannot adapt themselves to this reduction they are separated and then expelled.

Frankl has recently stated his opinion that the placenta is more adaptable to variations in the area of its attachment than is generally supposed. His view is that the separating agent is hæmorrhage from the engorged decidual vessels and that uterine contractions act as detrusors only after the placenta has been thus separated. The placenta is usually attached to the decidua, but in some few instances the condition of placenta accreta or increta is found, in which partial or complete atrophy of the uterine mucosa, due to various pathological states, is present and in which, owing to defective development of the decidua the villi penetrate to the uterine muscle and cause damage or partial destruction. Dietrich, in 1922, collected 19 recorded cases of this condition, and advised hysterectomy, as normal or complete manual separation is impossible owing to the penetrative attachment.

The stimulative agent to chorionic attachment is believed to exist in the corpus luteum of the ovary. This view was originally put forward by Prenant in 1898, and later by Ludwig Fraenkel in 1901 who concluded that the corpus luteum is a ductless gland which in the human female is renewed every month; its function is to control the nutrition of the uterus from puberty until the menopause, to prepare the endometrium for the embedding and maintenance of the ovum, and to maintain the raised nutrition of the

uterus during early gestation. Fraenkel supported his theory by experimental double oöphorectomy on rabbits, performed from one to six days after coitus, the period of gestation being 30 days. Abortion followed in all cases but not in the controls, in which only one ovary was removed. Similar experiments on dogs and rats were reported by Marshall and Jolly in 1905 with proper controls, and similar results were obtained, but in this series it was noticed that abortion occurred only when both ovaries were removed early in pregnancy. " In other cases (in the rat) in which the ovaries were removed at periods varying from the sixth day until near the end of pregnancy, the young were produced normally at full time."

Blair Bell and Hick, in 1909, performed a similar series of experiments on rabbits and does with controls, and obtained results similar to those quoted, but Bell is of opinion that a comparison can hardly be made in this respect between rabbits and the human subject. On the other hand a number of cases have from time to time been reported of double oöphorectomy performed early in pregnancy in the human subject with no interruption of gestation, and while in some of these, no doubt, a portion of ovarian tissue had been left this cannot be claimed for all.

Lochhead says: " It must be pointed out, however, that there is no evidence that the corpus luteum governs the fixation of the embryo in any other than the indirect sense implied in the supposition that the secretion elaborated by that organ acts as a stimulus which excites the uterine mucosa to undergo the necessary hypertrophy. In this general sense, also, it is probably true that the luteal secretion (or, at any rate, the secretion of the ovary) assists in nourishing the embryo during the first stages of pregnancy, since there is every reason for concluding that it helps to maintain the raised nutrition of the uterus." The corpus luteum therefore is not necessary as an aid to fixation in the later months. Physiologically the corpus luteum undergoes atrophy at this period, and it has been suggested that the atrophic changes which the decidua basalis and vera undergo in later pregnancy are due to the withdrawal of this secretion. Loeb showed that decidual formation was due, at least partly, to mechanical stimulation of the mucosa sensitized by the corpus luteum. By introducing foreign bodies such as glass rods into the uterine cavity localized overgrowths of decidua—deciduomata—were produced.

The present opinion, therefore, is to regard the blood-borne hormone of the corpus luteum as a sensitizing agent to the uterine mucosa to facilitate the embedding of the ovum and to produce the necessary hyperæmia to allow uterine hypertrophy and growth of the ovum.

The Circular Sinus.

The circular sinus is a structure prominently described in most text books. It is a blood sinus incompletely encircling the periphery of the placenta. Well marked in some specimens, in others no trace of it is to be found, and in the majority of cases it is but indistinct. It is situated in the angle between the placental margin and the chorion læve. It is not a formed vessel but an irregular space of varying diameter formed in the marginal dilated portion of the intervillous spaces, the inner and upper walls being formed by the fibrinous cohesion of adjacent clumps of villi, while the floor is formed by the basal plate of the outermost portion of the decidua basalis. From the outer wall of the sinus veins take origin, the ruptured mouths of which can usually be seen, while through the openings the villi on the inner wall are visible.

Some observers, however, *e.g.*, Friolet, have described an endothelial lining to the sinus, and have deduced from this that the above description is incorrect and that the sinus is a truly-formed blood vessel, but Grosser holds that such endothelial-like cells are really trophoblastic epithelium stretched out and correspondingly altered in appearance.

From the above description it will be seen that the main structural changes which occur in the placenta in its later period are degenerative. The villi, at first, large and covered with a complete double layer of surface epithelium with an open myxomatous stroma containing blood vessels, which are thin-walled even in the villous stems, become progressively smaller in section due to continual branching; the layer of Langhans' cells disappears, and later the syncytium also becomes incomplete so that areas are left here and there on the surface of the villi, denuded of epithelial covering, on which fibrin is deposited in increasing flakes from the coagulating blood in the intervillous spaces. "Infarcts," visible to the naked eye, or microscopic masses of fibrin gluing adjacent masses of villi together, are thus produced.

As the stem villi increase in size and the arborizations multiply an increasing blood supply is called for, so that in the stem villi the arteries become of an adult appearance with crenated tunica intima, thick media and a whorled externa. Some observers have described endarteritis which, if present, would further add to the appearance of degeneracy.

The decidua is at first a thick vascular membrane in which well formed decidual cells are plentiful; from the third month degenerative changes appear. Fibrin striæ are deposited here and there, the tips of the anchoring villi invade and erode it, and, finally, at

term the membrane is greatly atrophied and fibrotic and forms only a thin and imperfect layer on the uterine surface of the placenta.

In post-maturity one would expect to see these degenerative changes more evident even than usual, and this expectation is fulfilled according to Ballantyne and Browne. These authors describe the changes of post-maturity in the placenta as consisting of non-vascularity, many of the small villi having no vessels and all of them possessing fewer than is normal at full time. More or less obliteration of the lumina of the vessels by endarteritis was constant. Here and there areas of calcification were present. There was no enlargement of the villi and so the organ as a whole was not enlarged. "The changes were not pathognomonic, but revealed in a higher degree what is normally found in the mature placenta; it was a matter of degree."

The amount of blood in the intervillous spaces varies; in a placenta fixed *in situ* the spaces are seen to be full of red blood corpuscles, but in an expelled placenta they are relatively few in number. It is supposed that the uterine contractions during labour expel most of the intervillous blood into the uterine veins before the placenta is shed; also, as Young points out, intervillous blood does not coagulate, so that, if the placenta be placed in fixing fluid for some days before sections are cut, the greater part of the blood in the intervillous spaces becomes washed out. Fibrin deposits, of course, are retained in the placenta.

It is important to remember these points in the microscopical examination of a section of the placenta lest these physiological senile changes may be interpreted as evidence of placental disease; this probability is heightened by the fact that owing to its spongy structure the placenta is by no means an easy organ to cut and stain satisfactorily. Again, our knowledge of placental pathology is, at present, so imperfect that even the best histologists are at times divided in opinion as to the interpretation of the appearances seen on examination of placental sections.

The presence of fat and glycogen in the villous epithelium has not been described; it is proposed to reserve this for discussion when the physiology of the organ is considered.

The Expelled Placenta.

Plane of separation. It has been noted that the deeper layers of the decidua are of an almost cavernous structure, and this is generally regarded as a preparation for facilitating the separation of the ovum through this layer at birth. This was first pointed out by Langhans and supported by Barbour, but Webster, going on the fact that the amount of decidua present on the surface of the placenta is small, concluded that the plane of separation is mostly

through the deeper parts of the compact layer or through the junction between the spongy and compact layers; but he agreed with Priestley and Leopold that in manual separation the line of cleavage would be through the spongy layer.

The expelled placenta consists from within outwards of an inner layer of amnion lying on the chorionic membrane from which project the uncountable host of villi now in various stages of degeneration, with fibrinoid deposits lying between them; between the villi is maternal blood, and attached to the outer or uterine surface is a layer, usually thin but of varying thickness, of the compact and spongy layer of the decidua basalis.

The appearance of the expelled placenta is well known, and it is not proposed to enter into a minute description which can be found in any good obstetrical text book.

Certain points, however, require discussion. As regards *the weight*, this is usually between 1 lb. and $1\frac{1}{4}$ lb. (453—566 grms.), but it varies within limits, and normal placentæ up to 600 grms. are often found. Of more importance than the weight alone is the ratio of the weight of the placenta to that of the fœtus—the weight ratio—which is usually quoted as 1 to 6, although Holland found the weight ratio in 94 fresh and 64 macerated fœtuses to be 1 to 8. Sfameni (quoted by Luciani) estimated the normal weight of the placenta as 408 grms. without the cord and membranes, and the usual weight ratio under these conditions is 1 to 7.78 and not 1 to 6 as usually quoted. This is in agreement with Holland's findings as he always separated the membranes before weighing the placenta.

The weight ratio varies normally with the age of gestation, the younger the fœtus the larger relatively the placenta, and hence the weight ratio will be reduced in premature cases.

Dividing fœtuses into three classes (*a*) those under 1,800 grms., (*b*) those between 1,800 and 3,000 grms., and (*c*) those over 3,000 grms., Holland found in fresh fœtuses that the weight ratio was 1 to 6, 1 to 8 and 8 respectively, while in macerated fœtuses the weight ratios were respectively 6, 8 and 10, and in 34 syphilitic placentæ the weight ratio was 5 and 7 in the first two classes, while no cases came into the third class. This subject will be returned to when discussing pathological conditions of the placenta in a future review.

The placental-umbilical-vessels radiate out from the insertion of the cord in convoluted branches which subdivide, and their ultimate terminations are seen extending to the extremities of the villi. It is important to remember that nerve endings cannot be found in the walls of these vessels, therefore their calibre must be controlled by some agency other than innervation. Schmitt, in 1922, published

his experiments on this subject and found that the placental vessels dilated in response to amyl nitrite and warmth and contracted to histamine, pituitary extract and barium chloride, but showed little reaction to adrenalin even in 51 to 1000 concentration. The vessel tone, however, was increased in response to oxygen, and from these experiments it is suggested that the calibre of the placental vessels is regulated by the amount of oxygenation of the fœtal blood, that when oxygen is plentiful the vessels contract and in conditions of anoxæmia they dilate. The mechanism of calibre control of the placental vessels is thus unique in the body.

This resumé will indicate to the reader the large number of problems connected with the growth and structure of the placenta that still await solution, and it is in the hope that the necessary research will be stimulated that the review has been compiled.

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CLINICAL REPORTS.

A Case of Inversion of the Uterus caused by a Squamous-celled Carcinoma of the Fundus.[1]

By HERBERT WILLIAMSON, M.B., B.Ch. (Cantab.), F.R.C.P. (Lond.),
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and
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C. B., aged 54, married 23 years, was admitted to St. Bartholomew's Hospital on May 14, 1923, complaining of a profuse vaginal discharge—offensive and blood-stained.

Menstruation had commenced at the age of 14, the cycle was 28 days, the duration seven days and the flow profuse. The menopause occurred in 1921.

The patient had never been pregnant.

She was in her usual health until October, 1922, when she first noticed a vaginal discharge, sometimes blood-stained. This gradually increased in amount. In March, 1923, the discharge became yellow and offensive, and hæmorrhage occurred two or three times weekly. About this time she commenced to suffer severe pain, felt chiefly in the sacral region; she became anæmic and her health deteriorated rapidly; she also developed incontinence of urine on coughing and on exertion and when lying in bed. These symptoms persisted to the time of her admission.

When first seen the patient looked ill, she had a yellow sallow complexion, her tongue was furred and she was anæmic. The temperature was 100.4° F. and the pulse-rate varied between 80 and 100.

Abdominal examination revealed nothing abnormal. The vagina was occupied by a sloughing irregular mass as large as a man's fist; the tissues composing it were friable and large fragments came away on touch. The relation of the mass to the cervix uteri was not definitely determined, but the anterior lip could be felt high up behind the symphysis pubis and its texture was apparently normal. The examination caused such profuse hæmorrhage that it was abandoned, the vagina hastily plugged and an anæsthetist sent for. On his arrival the plugging was cautiously

1. Read at the Obstetrical Section, Royal Society.

withdrawn and the remainder of the mass removed by the finger. It was then discovered that the uterus was completely inverted and that the necrotic mass was attached by a broad pedicle to the fundus. The growth was easily detached and left an irregular area of ulceration, measuring approximately 3 cm. in diameter, on the fundus; several small hard nodules were felt about its periphery.

The vagina was plugged and the patient sent back to bed. Vaginal douches of lysol were given twice daily and at the end of a week the discharge had almost ceased and the surface of the inverted uterus appeared clean.

Microscopical sections of the growth proved it to be a carcinoma.

For the last two years we have made a practice of irradiating malignant growths of the uterus before removal, but in this case we hesitated to apply radium until the septic condition of the vagina and growth had been improved. On May 23rd radium was applied: 13 needles containing in all hydrated radium bromide equivalent to 62 mgrms. of radium metal screened by 0.4 mms. of platinum were inserted into the tissues around the periphery, and two tubes containing hydrated radium bromide equivalent to 99.4 mgrms. of radium metal screened with 1 mm. of platinum were placed in contact with the growth and kept in position by means of gauze plugging. Tubes and needles were left *in situ* for 48 hours. The total dose was therefore approximately 7,650 millicures. Examination on June 4th showed that the ulceration was healing. On June 11th panhysterectomy with removal of both ovaries and tubes was performed by the abdominal route. Convalescence was uninterrupted and the patient left hospital on July 2nd.

Description of the specimen. The specimen consists of uterus, ovaries and Fallopian tubes. The uterus measures 6.5 cm. in length. The body is completely inverted and is seen as an ovoid mass protruding through the dilated cervix which surrounds it like a collar. The greatest circumference is at the lower pole and measures 14.5 cm. The mucosa covering the inverted body is rugose and ulcerated in places. A rounded nodule of growth measuring 2.8 cm. in diameter and raised 1 cm. above the level of the surface is situated to the right of the fundus near the uterine ostium of the Fallopian tube. From this nodule a section has been prepared. Below this, on the fundus, is a smooth oval area measuring 2.5 by 2 cm. marking the site from which the vaginal mass was detached and to which the radium was applied. The uterine ostia of both Fallopian tubes are seen and a coloured glass rod has been inserted into each. The ovaries and tubes are seen at the top of the specimen and are drawn into the cup-like depression of the peritoneal surface produced by the inversion. The abdominal

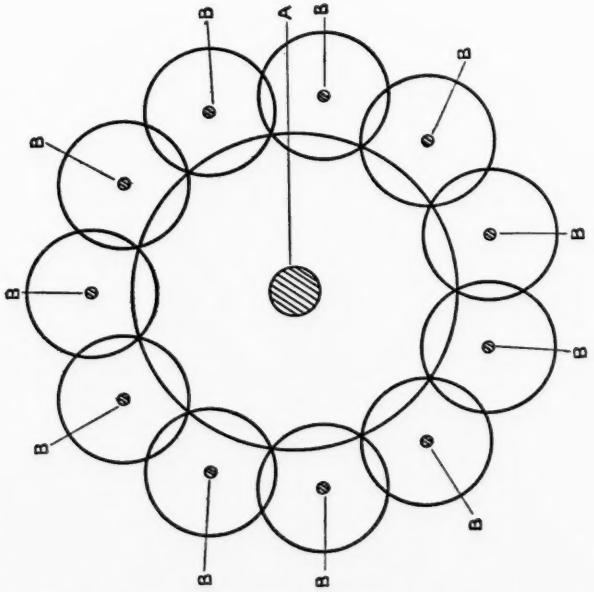

Fig. 1. Diagram to show arrangement of radium tubes and needles. The shaded dots represent the radium. The circles indicate the area of growth irradiated. A, tubes containing hydrated radium bromide equivalent to 99.4 mgr. of radium metal; B, needles containing collectively hydrated radium bromide equivalent to 62 mgr. radium metal (diagrammatic).

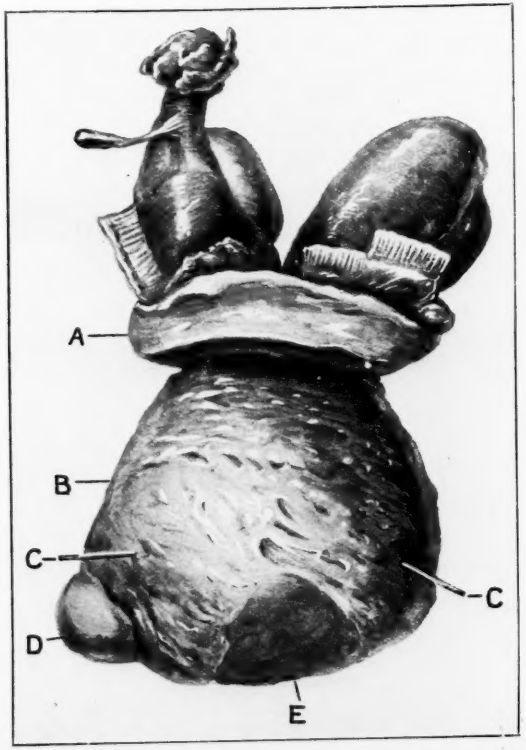

Fig. 2. Specimen of inversion of the uterus caused by squamous-celled carcinoma of the fundus. A, cervix uteri; B, inverted body; C, uterine ostia of Fallopian tubes; D, nodular growth; E, area from which vaginal mass was detached.

ostium of the left tube is sealed and the infundibulum dilated into a club-shaped swelling. The ostium of the right tube is patent. Both are infiltrated with blood. A small accessory tube with closed ostium is attached to the ampulla on the right side.

We are indebted to Sir Bernard Spilsbury for the following description of the microscopical appearances :—" *Sections prepared from the fundus uteri* show a malignant growth which consists of dense fibrous tissue traversed by small masses and narrow columns of tumour-cells. The cells, many of which are compressed by the fibrous-tissue, are of different sizes and shapes. The arrangement of the cells suggests either a squamous-celled cancer or an endothelial sarcoma, but the presence of prickle-cells and of areas of keratinization in sections of the growth removed on May 15th indicate that the tumour is an atypical squamous-celled cancer. No mitotic figures have been observed. *Sections of the area exposed to radiation* show a broad strip of recently formed and vascular fibrous tissue adjacent to unstriped muscle. Between the two tissues is a zone in which hyaline necrotic material and blood-cells can be seen. In this zone are numerous multi-nucleated giant-cells of the order of foreign body giant-cells. No malignant growth is visible in the section and there is no indication that the necrotic tissue was originally neoplastic. *Sections of the inverted uterine wall* show unstriped muscle with a little fibrous tissue on its surface and several glands which penetrate for a short distance into the muscle. The glands are lined by columnar epithelium arranged regularly, but the lumina are somewhat compressed. There is no inflammatory reaction around the glands and no indication that they are neoplastic. The condition is probably an irritation over-growth."

It is not easy to understand how a squamous-celled carcinoma can arise in the fundus uteri. The first explanation to suggest itself is that the inversion preceded the growth and by a process of metaplasia the epithelium of the inverted fundus was converted into the squamous type. The patient, however, had never been pregnant, and the specimen shows no fibroid in the wall so that it is difficult to see how the inversion could be produced; and, moreover, where epithelium is preserved on the inverted wall, it is columnar not squamous-celled. Further the sudden development of frequent and profuse hæmorrhages, pain and incontinence of urine in March, 1923, suggests that the inversion took place at that time.

Chronic inversion of the uterus due to a malignant growth attached to the fundus is not common, and in nearly all recorded cases the growth has been a sarcoma. In 1911 Thorn[1] collected 437 cases of inversion of the uterus of which 83 were caused by a

neoplasm, and of these five only were due to malignant growths. Of these, four were sarcomata and the nature of the fifth is not clear : it is one of the cases recorded by Stark[2] and will be considered presently. In 1919[3] Spencer recorded nine cases of chronic inversion of which four were caused by neoplasms, but one only, a spindle-celled sarcoma, was malignant. In 1913 Stark[2] recorded two interesting cases, but the descriptions of the tumours make it improbable that the growths were carcinomata. The first patient was a woman aged 57. A sloughing mass was found in the vagina attached to the fundus of the inverted uterus, the patient was desperately ill and no operation was performed. The tumour was reported as "undoubtedly malignant and composed of large epithelioid cells . . . . There is no trace of fibromatous, muscular or glandular structures in any part. It is carcinomatous of an endothelial type." This description suggests that the tumour was an endothelioma and therefore a sarcoma or mesothelioma rather than a carcinoma.

Stark's second patient was a woman aged 55. The vagina was blocked by a gangrenous friable tumour which at first appeared to be a polypus, but on further examination was found to be the inverted uterus with a malignant neoplasm attached to its fundus. The case is described as one of inversion of the uterus caused by a cancerous tumour of the fundus, but Teacher's report upon the growth states that it is "a perfect example of an endothelioma." It is doubtful therefore whether the growth in the first case was a carcinoma and certain that the growth in the second was not.

As far as we have been able to ascertain there is no record in the literature of an authentic case of chronic inversion of the uterus caused by a carcinoma of the body, and we have brought the specimen before the Section to-night because of its rarity.

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A Case of Ovarian Pregnancy.

By

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As cases of ovarian pregnancy are still of comparative rarity this is thought worthy of record.

Mrs. C., aged 26 years, was admitted to the Western District Hospital, Glasgow. When seen by one of us on February 19 she complained of severe pain of sudden onset in the left iliac region. The temperature was subnormal, pulse-rate 160 and respirations 42 per minute. On examination, there was tenderness in the left lower abdomen and below the right costal margin. In the left iliac fossa a mass could be felt extending two inches above Poupart's ligament. Bimanual examination showed the mass to be distinct from the uterus, which was pushed upwards and to the right. The patient was extremely emaciated. The collapsed condition of the woman negatived immediate operation. Under appropriate treatment she slowly improved, and the following history was then obtained:—

She had been married eight years, and had never missed a period until Christmas 1922. In the beginning of January, 1923, she felt sick in the mornings, but attributed this and the amenorrhœa to "anæmia." About January 17 she first complained of pain in the left side of the abdomen, and until admitted to hospital she suffered continuous discomfort. During this period she also had difficult and painful micturition. Her husband had been unemployed for eight months, during which time she was unable to obtain adequate nourishment.

On February 24 a hæmorrhagic vaginal discharge appeared and lasted four days. On the 27th a uterine cast was passed. The mass in the left iliac fossa appeared to diminish a little, and her general condition slowly improved. She was kept under close observation, and arrangements were made to operate if there was any indication of fresh bleeding. Improvement in her condition was uninterrupted, and operation was performed on April 26, 1923.

On opening the abdomen there was no free blood in the peritoneal cavity. An almost spherical firm tumour was felt lying in the pelvis to the left and behind the uterus. The tumour was easily raised out of the pelvis, there being practically no adhesions. Its attachment extended from the left cornu outwards on the back of the left broad ligament below the Fallopian tube; the attachment was clamped, divided, and ligated and the tumour removed. The abdomen was closed, and the patient made an uneventful recovery.

On examining the tumour, over part of the surface the tissues appeared more solid than elsewhere. Through this the tumour was incised, opening up a cavity in which was brownish fluid and a sac containing a fœtus. This sac was opened and the fœtus exposed. The umbilical cord of the fœtus was seen to be attached to the inner surface of the cavity near the incision and at a point corresponding to the solid tissue on the surface.

The specimen, after being fixed, was examined. It consists of a mass of blood-clot almost spherical and with slightly bossed surface. It measures 8 cm. in diameter. Over one-half of the surface is situated a cap of solid tissue (Ov.); through this an incision has been carried almost to the opposite pole (Fig. I). The solid tissue measures 1.5 cm. in thickness at its middle, gradually tapers to the periphery and is finally lost. In the centre of the mass a smooth-lined cavity with tuberose projections is seen. The lining consists of chorionic membrane (Ch.). Within this lie the ruptured and shrivelled amniotic sac (Am.) and the fœtus. The amniotic membrane remains attached only at the insertion of the umbilical cord. The cord is inserted at a point in the wall nearly corresponding with the greatest thickness of the solid tissue. The fœtus measures 7.3 cm. in length.

A slice was removed from the half of the specimen carrying the insertion of the cord. From this blocks of suitable size were made and sections cut. Fig. II is a drawing from one of the sections. The solid tissue in all the sections can be identified as ovarian tissue (C). The stroma cells of the ovary are swollen and less spindle-shaped than usual. At no point could this be regarded as a decidual change. No lutein cells are seen in the sections. Numerous primordial follicles of normal appearance are present. One semi-mature follicle was encountered. In it a small hæmorrhage into the discus proligerous was noted. Corpora albicantia (E) are numerous. Abnormally large thick-walled vessels (F) in considerable number are present. In some of these a calcareous deposit in the walls is seen.

On the outer aspect of the sections the tunica albuginea (G) is apparent. Towards the cavity the ovarian stroma gives place to a fairly thick fibrous semi-necrotic zone (B). In this zone numerous

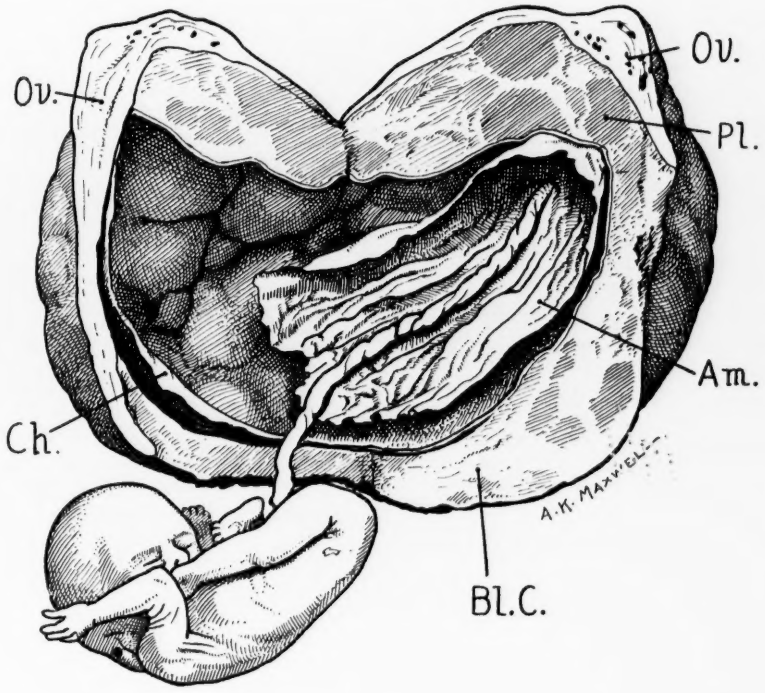

Fig. I.

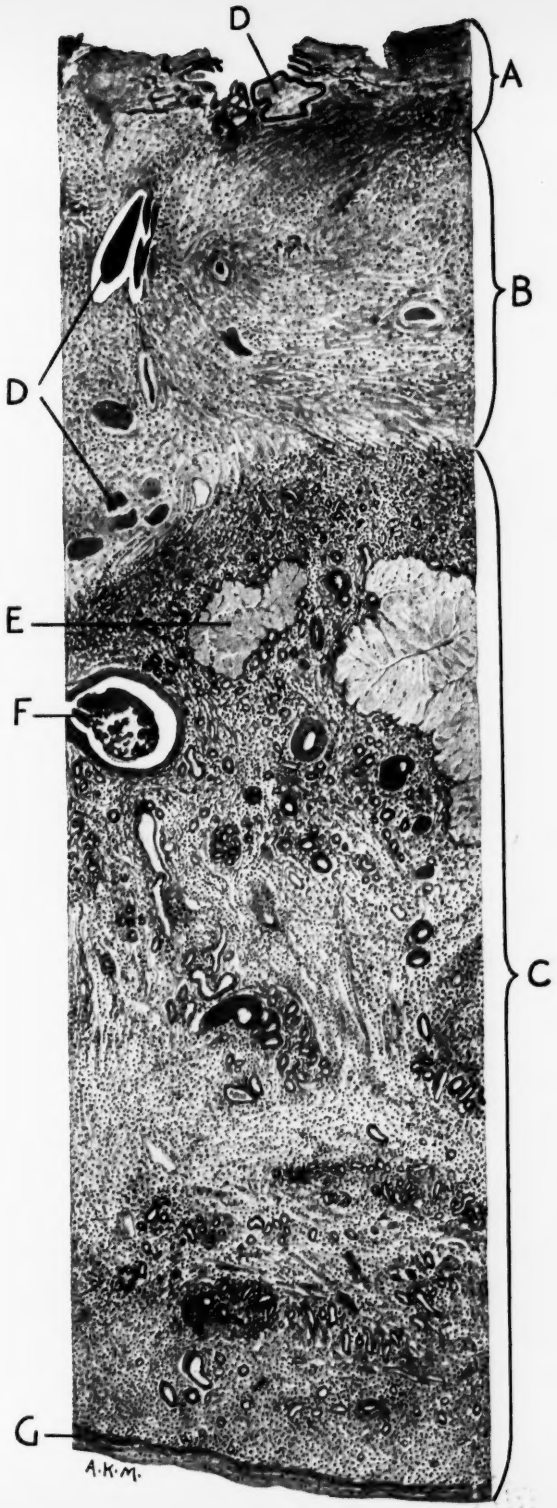

Fig. II.

villi (D) are seen. Villi pentrate this layer right up to the healthy ovarian tissue, but in none of the sections were they seen actually invading the latter. Between the fibrous zone and the chorionic membrane blood-clot (A) in layers of different age and of varying amount is present. Villi are seen throughout in sections from the vicinity of the insertion of the cord. These sections evidently include the placenta (Fig. 1, Pl.). In sections of the wall at the opposite pole of the specimen very few villi are encountered in the blood-clot (Fig. 1, Bl. C).

The chorionic villi are best preserved where the effusion of blood has been most recent. A thin layer of syncytium is present; Langhans' cells are seen but rarely. The majority of the villi have the typical fibrosed appearance seen in tubal pregnancy when the ovum has been dead a considerable time before removal. Some of the villi show calcification.

As lutein tissue was not identified in the wall of the cavity, search was made for a corpus luteum in the ovarian tissue and blood-clot, but without success. It was not considered worth while to destroy the specimen in the search as the pregnancy has in this case advanced too far to throw any light on the method of embedding and relationship to the corpus luteum.

The cast expelled by the uterus consists of several portions. It is composed of the compact layer of the decidua. Spaces corresponding to glands are seen, but the gland epithelium is absent.

Development of the ovum has advanced to about the third month. There is a history of five months' amenorrhœa. Death of the ovum two months before operation is consistent with the clinical facts and the histological picture.

The absence of blood in the peritoneal cavity and comparative freedom from adhesions are of interest. The condition may be regarded as an ovarian mole. The pain, rapid pulse-rate, and symptoms of collapse must have been occasioned by hæmorrhage into the implantation theory and not by free bleeding into the peritoneal cavity.

Microscopically, there is conclusive proof of continuity of chorion and ovarian tissue. The tube was not removed, and is not therefore available for histological examination. This leaves open the suggestion that the pregnancy may have been primarily tubal with secondary implantation in the ovary.

From the observations at operation and from the relationship of the ovarian tissue to the gestation sac, especially the fact that placental formation has taken place where the ovarian tissue is of greatest thickness, we are of the opinion that the case is one of primary implantation in the ovary.

BOOK REVIEWS.

"The Biology and Pathology of Women: A Handbook of Gynæcology and Obstetrics." Edited by JOSEF HALBAN, of Vienna, and LUDWIG SEITZ, of Frankfort-on-the-Main. Berlin and Vienna: Urban and Schwarzenberg, 1923.

THIS important German work by various writers is to be complete in eight volumes. It is being issued in numbers at monthly intervals, and the numbers are not necessarily issued in the order in which they will appear in the volume. The first two numbers have appeared this year.

The *First Number* is the first half of the second volume, and is issued at the price of 19.5 Swiss francs. The number begins with a Preface by the Editor, in which is sketched the general plan of the work, which aims at producing a treatise on Obstetrics and Gynæcology more in accordance with modern knowledge and less narrowly based on the localized study of Virchow's pathology than existing treatises.

The editors have enlisted no less than 75 collaborators, and a glance through the names and the epitome of contents leads to a pleasurable anticipation, somewhat damped by the statement that the whole work will not be completed for two or three years.

"The work will not only picture the disease-circumstances of the female genital organs, but will bring together anything which influences the origin and treatment of those diseases from procreation to the grave." The Editor rightly considers it of first importance to include in the work Obstetrics and the Comparative Physiology, Morphology and Pathology of the higher animals. Constitutional questions, racial doctrines and racial hygiene, laws of heredity and the influence of social and psychical conditions on bodily ailments will be considered.

In the matter of treatment not only a local therapy is to be adopted, but the influence of general treatment on the whole body (by means of light, warmth, water, protein-bodies, etc.) will be taken into account.

It will be seen that the Editors take a very broad and comprehensive view of the subject, and the whole work will show how far they have been able to get their 75 collaborators to take a similar view. We wish them success in their undertaking.

The first number consists of 464 large octavo pages with 170 excellent illustrations. The first article, on General Symptomatology and Diagnosis in Gynæcology, is written by Dr. Josef Halban. The second is on Gynæcological Investigation, by Dr. O. Polano. It includes electrical hysteroscopy (which is not much favoured) and the diagnosis by X-rays after inflating the peritoneum with air. The skiagram illustrating the latter method is one of the few unsatisfactory figures in the book. The third article is by Dr. Robert Köhler on Medicinal Treatment and Organo-therapy. The fourth article is by Dr. Paul Lindig on the Treatment by Protein Bodies. The fifth article on Röntgen and Radium Treatment by Dr. Ludwig Seitz, contains 75 pages, and gives a very full account of the subject, both from the scientific and practical point of view.

Considerations of space prevent us from giving a detailed account of the work. We need only say that it will be found to be indispensable to the gynæcologist, and if the remaining portions are of equal value to the first number it will prove to be a worthy successor of the great German work Veit's "Handbuch de Gynäkologie."

The *Second Number* (which will be the first part of the first volume) contains 288 pages, with 47 illustrations, and is priced at 12.50 Swiss francs. In the first 202 pages Dr. J. Fischer deals with the History of Gynæcology; in the remaining portion of the number Prof. Lubosch treats of the History of the Normal Development of the Female Generative Organs. The history of gynæcology is traced from Babylonian and Assyrian through Egyptian, Jewish, Indian, Persian, Greek, Arabian and Roman to modern times, and several interesting illustrations are given, including one from the Brussels Muscio MS. (written about the year 900), in which the part of the body of the uterus between the Fallopian tubes is labelled *fundus*. The antiquity of this illustration should suffice to prevent the error common amongst certain modern gynæcologists of treating *fundus* as synonymous with *corpus*.

The work of Johannes Anglicus (John of Gaddesden, 1280—1361), "Rosa Anglica" ("Practica medicina a capite ad pedes") is the first English work in the 14th century. Of Italian midwifery in the 16th century Scipio Mercurio's "La Comare" is correctly dated 1595; but the illustrations are taken from the 1621 edition. No express mention is made of Raynald's "Byrth of Mankynde" (the English translation of Rhodion's work), the first edition of which was printed in 1540. For want of consulting English literature (Ballantyne, *Journ. of Obstet. and Gynæcol. of Brit. Emp.*, vol. 17, p. 329) the author has missed an opportunity of correcting v. Siebold and Fasbender, both of whom give the date as 1654!

Amongst the writers of the 17th century William Harvey's researches on generation are given, but no mention is made of his obstetrical and gynæcological observations (see Harveian Oration, 1921). A good account is given of the development of midwifery in England in the 18th century, mainly through the work of Smellie, W. Hunter and Denman. The last, who was obstetric physician to the Middlesex Hospital, wrote an important work, "An Introduction to the Practice of Midwifery," which promoted the induction of premature labour in English practice: a little known work by the same author, "Observations on the Cure of Cancer," 1774, is also quoted. A satisfactory account is given of the history of obstetrics and gynæcology in various European countries and in China and Japan. Fig. 33, representing the "title-page of Jacob Rueff, 1554," is perhaps taken from the German edition, which we have not seen; it differs from the title-page in the Latin 1554 edition, which we have inspected. Fig. 34 is printed upside down. This History of Gynæcology (which includes the history of midwifery) invites comparison with the larger work on the History of Midwifery, by Fasbender. The work by Fischer is less complete, and contains fewer bibliographical details than Fasbender's work; but it is an excellent account of the history of gynæcology and obstetrics which everyone interested in these subjects will wish to possess. It would be a convenience if an index of names were added.

The second portion of this number, by Prof. Lubosch, gives a complete account of the development of the female sexual organs: it is enriched by many fine illustrations of specimens in the Marburg Institute which render the reading of this difficult subject unusually easy. There is a bibliography of the chief works dealing with the subject at the end of each chapter. For a fuller account of the literature of development reference is made to Felix ("Entwickelungsgeschishte des Menschen," 1910). H. R. S.

MINISTRY OF HEALTH.

"Reports on Public Health and Medical Subjects." No. 15: Notes on the Arrangements for Teaching Obstetrics and Gynæcology in the Medical Schools. No. 21: The Teaching of Midwives. By JANET M. CAMPBELL, M.B., M.S., Senior Medical Officer for Maternity and Child Welfare. Ministry of Health.

THESE two Reports to the Minister of Health, dated respectively March 1923 and July 1923, embody the results of a careful enquiry into the existing arrangements for teaching medical students, and for training midwives, undertaken personally by Dr. Janet Campbell herself. The author has, however, gone a good deal further than this and has given expression to her views as to deficiencies in the existing arrangements, and the direction in which the improvement should be sought. The Reports, therefore, form a striking illustration of the comprehensive view of their functions held by the Medical Officers of the Ministry, inasmuch as the work of the General Medical Council, the examining bodies and the medical schools is all subjected to the discriminating scrutiny of their trained minds.

Report No. 15 will be welcomed by all obstetric teachers, both for the detailed information about present arrangements in the different schools which it contains, and for its advocacy of the improvements for which they have been contending for some years. Most of Dr. Campbell's criticisms of the present, and recommendations for the future, will in fact be found to follow closely those of the Report (to which she refers) made by a specially appointed Committee to the Section of Obstetrics and Gynæcology of the Royal Society of Medicine in 1919. Obstetric teachers will, therefore, cordially welcome the valuable support which the issue of this Report by the Ministry undoubtedly gives them.

The first part of the Report reviews the various recommendations which have been made by the General Medical Council with regard to the teaching of midwifery and gynæcology from 1869 to 1922. The second part forms a resumé of the arrangements for teaching at all the Medical Schools in England, Scotland and Wales, and makes clear how great is the inequality which exists as between one school and another. At the same time, progress is recorded in levelling up the laggards to a more satisfactory plane of efficiency. The third part—"General Observations"—gives the author's view of what the State expects, and has a right to expect, of medical men who undertake the care of pregnant and parturient women, and we shall all cordially endorse the high standard which she lays down. The mundane question as to how the average doctor is to be adequately remunerated for the increased time, care and skill which it is his duty to devote to his patients, does not, of course, come within the limits of Dr. Campbell's Report, but it is an urgent and eminently practical question all the same. The fourth part is devoted to "Particular Arrangements" in Teaching, and sets forth very clearly the advantages of ante-natal clinics, of maternity beds for training, of maternity district work, and other matters. We can only hope that Dr. Campbell's advocacy of our ideals will be useful with the lay authorities which have still to be convinced of their importance, and to whom we must look for financial assistance in carrying them out.

Report No. 21 follows much the same plan as the preceding one. It will be found to contain a large amount of carefully gathered information about the regulations governing the training of midwives, not only in this country, but in the principal countries of the Continent of Europe and in the United States. Further, a great deal of information is given about the work done by midwives in county boroughs and in rural districts in England and Wales, showing, in the case of the county boroughs, the proportion of births attended by them, and the

maternal mortality of their cases. These are most interesting and instructive figures.

The greater part of the Report deals with the proposed extension of the period of training to twelve months for untrained pupils, and to six months for those who have already been trained as nurses. Dr. Campbell approaches this matter from the point of view of the requirements of the Public Health Service of the country, and the position of midwives and maternity nurses in that service.

The Report then proceeds, in an authoritative manner, to define the arrangements for training which should be made under the extended scheme, and insists that ante-natal care, the management of premature infants, the nursing of cases of puerperal fever and of ophthalmia neonatorum at special hospitals, and the management of infants and young children, should all be included in the training. It is somewhat disturbing to find that Dr. Campbell quotes with approval the opinion of her colleague, Dr. Jane Turnbull, that the midwife should be responsible (*inter alia*) "for the estimation in the later months of the proportion between the fœtal head and the pelvis." Obstetric teachers very well know that this "estimation" is the most difficult point in ante-natal examination, and the one which medical students find most difficulty in mastering. It requires, in fact, in all cases a high degree of skill, and not infrequently, the aid of a general anæsthetic; to suppose that the duty of carrying it out can ever, with safety, be entrusted to midwives is to lose touch with clinical realities completely.

The vexed question of the "Handy-Woman" is dealt with in a manner which cannot fail to cause uneasiness. The proposal to register these women (without any pretence of training whatever) appears to be approved of, and methods of carrying out such a scheme are discussed. The reasons advanced for registering the lineal descendants of Sairey Gamp are apparently that certain medical men habitually employ them, and even "cover" their practice as midwives, and further that there are not enough trained women to go round. The official recognition of such women as a feature of the maternity service of the country would be in fact a deplorable and calamitous lapse from all reasonable standards of efficiency; it would stereotype, and tend to render permanent, a system which ought to be abolished at the earliest practicable opportunity, by penalties sufficiently severe to act as an absolute deterrent.

"The Jacksonian Essay: The Effects of Radium upon Living Tissues." With special reference to its use in the Treatment of Malignant Diseases. By Sidney Forsdike, M.D., B.S. (Lond.), F.R.C.S. (Eng.). London: H. K. Lewis and Co., Ltd. Pages 72, price 5/- net.

The Author gives a short account of the clinical and physical properties of radium, and of the amount of penetrating powers of the three types of rays emitted by it, and reviews the work of other observers on the effects produced in various living tissues by radium rays, and gives details of the methods of excluding the alpha, beta or gamma rays. The remainder of the essay is largely an account of the author's own experimental work and clinical observations.

In his experiments he used cats, and radiated the ovary with 50 or 100 mg. of radium. He applied the radium tube directly to the ovary by abdominal operation, and in these experiments removed the tube after various lengths of exposure and destroyed the animals at different times after the exposure. He gives a series of micro-photographs of these ovaries, which show clearly the destructive effects of radium rays on the ovaries, the destruction being obviously increased by the duration of the exposures. He found 30 to 60 minutes exposure produced no gross structural

changes in the ovaries, whereas two hours completely destroyed the large graaffian follicles, and 19 hours exposure destroyed the ovaries beyond recognition under the microscope.

He discusses the effect of radiation on various types of malignant growths, and gives the opinions and statistics of many workers.

The Author has treated a large number of cases of carcinoma of the uterus, cervix, vagina and vulva, and forms his conclusions mostly from these cases. He finds the fungating cervical carcinoma is much more successfully treated by radium than in the type in which the surface of the growths is represented by an ulcer with little or no cervix remaining. He shows from a series of micro-photographs the effects produced in carcinoma of the cervix by radium. He describes his technique in the treatment of cervical carcinoma, and quotes some interesting cases at length. He accentuates the danger of hæmorrhage from massive necrosis, that may follow the radiation of infected growths, and also of the danger of radiating tissues recently operated upon. This latter we are not convinced is so serious a danger as it is usually considered to be.

He publishes as an appendix to the Essay his paper on the Treatment of Severe and Persistent Uterine Hæmorrhage by Radium, and with a report of 45 cases. The excellent results obtained in cases of chronic metritis causing severe hæmorrhage near the menopause are well illustrated in this paper.

The Jacksonian Essay contains information of the greatest value to all who use radium in the treatment of diseases, and especially those who employ it in gynæcological cases. We can strongly recommend it as a short, clear account of the action and uses of radium. T. P. H.

"Clinical Report, Maternity Department, Jessop Hospital, Sheffield." By J. E. Stacey.

"Medical Report, Leeds Maternity Hospital."

"Registrar's Report, Maternity Hospital and Ladies' Charity, Brownlow Hill, Liverpool." By A. Leyland Robinson.

"Clinical Report, Maternity Department, St. Mary's Hospital, Manchester." By J. W. Bride and E. S. Horrocks.

In comparing these reports, one is struck by the difference in arrangement and diversity of details given.

Manchester, in drawing attention to the fact that such reports are compared by other hospitals, apparently to excuse its very high death-rate, announces that it is in a very peculiar position, as it admits abnormal cases from outside, often after attempts at delivery have been made. No evidence being produced that it does this more frequently than any other maternity hospital, its "peculiar position" is not obvious.

Leeds calls attention to the fact that it admits cases of puerperal sepsis as such, which does not appear to be the custom at the other hospitals. Leeds does not tell us how many such cases were admitted, but six women died of sepsis.

The method of arriving at the mortality is very confused. Not one of these reports deals with "cases." They all speak of "admissions." The term admissions is all very well as a basis for ordinary hospital work in which comparatively few cases are admitted twice, but in maternity work it is obviously grossly erroneous. For instance, if a hospital admitted every patient for observation or treatment six times, and eventually lost every case, its mortality would be 16 per cent. Surely the death-rate should be calculated on actual individuals dealt with. Cases discharged undelivered to be readmitted for delivery, should not be counted as two or three cases.

The actual figures given for Sheffield and Manchester seem to be wrong in themselves. At Sheffield 887 "cases" were treated, 187 at their own homes, and 700 in the wards, 67 of the latter being discharged undelivered (and presumably readmitted for delivery). Where are the other five? At Manchester the figures are even more inaccurate, stating that 1,544 "patients" were treated in the wards: 930 were delivered, 156 discharged undelivered (? readmitted for delivery), 276 had abortions, and 32 were admitted after delivery. One hundred and fifty patients are missing, yet the figure "1,544" is used to calculate the death-rate! There is a glaring error in Table XIII dealing with "Transverse lie," in which is the statement: "There were 28 cases during the year; one mother died from P.P.H."; and yet there are three cases of "transverse lie" among the death reports! Table XXVII, dealing with Eclampsia, shows 11 deaths. Table IV states that there were nine, and then gives details of 11! but Case 19, Reg. No. 343, is not in the Eclampsia Table, and Case Reg. No. 560 in Table XXVII is not in the death reports at all. There are many other discrepancies.

On the whole, the Tables dealing with Eclampsia are good, but the same cannot be said of the Tables showing results of treatment of pre-eclamptic albuminuria, except in the case of the Jessop Hospital, which gives full reports of the results of delivery of all patients admitted for treatment of toxæmia. Leeds states that 14 cases of albuminuria were "cured," and discharged undelivered, but does not state how many of them were readmitted with eclampsia. Manchester also omits to give the final details.

Manchester is the only Report to mention "Cardiac cases" apart from the special reports on deaths. Manchester treated eight "cases" (?) of heart disease: three were discharged undelivered, and five delivered. It does not say how, or with what result. There are five cardiac cases among the deaths; are these the same five? Presumably they are or more would have been said. What happened to the three discharged undelivered? Are they different patients, or are they included among the other five?

The wealth of detail in the Liverpool report is of the greatest value in comparing treatments and results. All the details that the most exacting could wish for are set out in tabular form. It is an excellent report, and would have been perfect if it had included a statistical enumeration of such abnormalities as twins, face, brow, breech, transverse, and contracted pelvis.

Examining the Leeds, Liverpool, Manchester and Sheffield Reports critically, it is very obvious how much more valuable for research work such Reports would be if the good points of each were combined and a uniform system agreed upon.

Cases admitted as emergencies, should all be shown on a Table giving complications for which admitted, treatment before admission, state on admission, subsequent treatment, and result. It is most important that one standard should be used for the maternal morbidity. There is a British Medical Association standard, and there is in existence a stricter standard known as the Queen Charlotte's Hospital standard. The Jessop Hospital gives both, and also gives a figure of its own arrived at by excluding all deaths from both these standards. Liverpool uses the B.M.A. standard—its own interpretation thereof, as it bases its percentage on "admissions." Manchester and Leeds appear to have invented an entirely new standard of their own, one giving a wonderful percentage, which is doubtless very gratifying to them, but very misleading and quite useless for purposes of comparison.

Could not representatives from the medical staff of each Maternity Hospital in the United Kingdom meet and draw up such a scheme, say on the invitation of the Obstetrical Section of the Royal Society of Medicine?

LOUIS CARNAC RIVETT.

"Synopsis of Midwifery." By A. C. MAGIAN, M.D. London: William Heineman, Ltd. Price, 8/6.

THE author states in the preface that the book is "intended to refresh the memory of students and practitioners," and he fulfills this project very fairly and fully. It is a short synopsis, and the author has succeeded in compressing a large amount of material into an exceedingly short volume, and at the same time has produced a work which is easy and pleasant to read, in marked distinction to the majority of such works.

The author states hat he has consulted many well-known writers, and this is obvious in that a number of his statements have been copied from text-book to text-book for generations without having any real existence in fact. For instance, the Azygos Vaginæ arteries are described as running longitudinally along the anterior and posterior vaginal walls. Almost every text-book describes such arteries, but have they ever been seen during the operation of total hysterectomy or when operating on the vagina? The author has also copied the statement that Transverse lie (he calls it "Transverse Presentation") occurs once in 250 labours! This figure appears to have crept into text-books from the fact that Transverse lies occur about once in 250 cases admitted to Lying-in Hospitals which have a high percentage of abnormal cases sent to them from a very large area, and is probably three or four times as high as the real figure. The author advocates the consideration of Cæsarean section rather more freely than the majority of the writers whom he has consulted.

In describing the normal second stage of labour, the impression is given that "a certain amount of tearing" must take place.

On page 164 it states: "'The vertico-mental' diameter measures 4½ inches, and on page 166 'the mento-vertical diameter' measures 5½ inches." Apart from this slip the book has been exceptionally well edited. The index is good, and it is easy to look up rapidly any point.

LOUIS CARNAC RIVETT.

Review of Current Literature.

DIRECTOR: FRANK E. TAYLOR,
M.D., B.S. (Lond.), F.R.C.S. (Eng.), M.R.C.P. (Lond.), D.P.H. (Cantab.)

THIS Review will contain the lists of contents, and abstracts of the more important articles, from the following journals, with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges:—

British.—The Lancet; British Medical Journal; The Hospital and Health Review Medical Science: Abstracts and Reviews.

American.—American Journal of Obstetrics and Gynæcology; The Journal of the American Medical Association; Surgery, Gynæcology and Obstetrics.

Australian.—Medical Journal of Australia.

South African.—Medical Journal of South Africa.

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et Gynécologie de Paris; Revue de Gynécologie et de Chirurgie Abdominale.

Belgian.—Bruxelles-Médical.

Italian.—Annali di Ostetrica and Ginecologia.

German.—Zeitschrift für Geburtshülfe und Gynäkologie; Archiv. für Gynäkologie; Zentralblatt für Gynäkologie; Monatschrift für Geburtshülfe und Gynäkologie; Münchener Medizinische Wochenschrift.

Scandinavian.—Acta Gynecologica Scandinavica.

South American.—Boletin de la Sociedad de Obstetricia y Ginecologia de Buenos Aires.

It is hoped that the Review of Current Literature will keep the readers of this Journal in touch with current work throughout the world. At the end of each year it is proposed to print an Index of all the subjects contained in the articles of the above journals. Arrangements will also be made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London: W. E. CROWTHER, M.B., JANE H. FILSHILL, F. E. TAYLOR, F.R.C.S.
Liverpool: ROBERT A. HENDRY, F.R.C.S.
Sheffield: W. W. KING, F.R.C.S.
Edinburgh: W. F. THEODORE HAULTAIN, F.R.C.S.
Glasgow: JAMES HENDRY, M.D.
Leeds: A. GOUGH, F.R.C.S.

Lancet.

July 7, 1923.

Twin tubal pregnancy. (Annotation.)

Causal factors of infant mortality up to one month of age—Value of Maternity Homes in a Maternity and Child Welfare Scheme. (National Baby Week Conference.)

Fibroma of the ovary. ALBAN DORAN. (Correspondence.)
The prophylactic treatment of puerperal sepsis. PITT-TAYLOR, F. S. (Correspondence.)

July 14, 1923.

A case of inspiratory apnœa in a new-born infant. KIRKWOOD, W. D., MYERS, B., and LUMSDEN, T. W.
Acute ketosis during pregnancy. ROBINSON, J. H.
Scope, staffing and administration of an Infant Welfare Centre.—Housing in relation to infant welfare. (National Baby Week Conference.)
The prophylactic treatment of puerperal sepsis. BLAIR, M. A. (Correspondence.)

July 21, 1923.

*Acute *Bacillus coli* infection of the gastro-intestinal tract in a new-born baby contracted from its mother. JEWESBURY, R., and DUDGEON, L. S.
*A case of quintuple pregnancy. FOSTER, S. R., and CARSON, W.
*Should infant mortality be reduced? WYNNE, F. E.

August 11, 1923.

Symphysiotomy, craniotomy and Cæsarean section. CHISHOLM, A. E.
The corpus luteum after hysterectomy. (Annotation.)

August 18, 1923.

Ante-natal diagnosis. HUXLEY, F. M.
Doctors and uncertified midwives. (Leading Article.)
Decapsulation of the kidney in eclampsia. (Annotation.)
*Treatment of syphilis in the woman of child-bearing age. RORKE, M. (Special Article.)
A new urethroscope and its use as a vaginoscope for the treatment of vulvo-vaginitis in children. HARRISON, W. L. (New Inventions.)

September 8, 1923.

Syphilis of the uterus and adnexa. (Annotation.)
Decapsulation of the kidney in eclampsia. PARAMORE, R. H. (Correspondence.)

September 15, 1923.

Some common conditions requiring ante-natal cure. HENDRY, R. A.
*Marriage, pregnancy, parturition and tuberculosis. WARD, E.
Acute salpingitis. BOURNE, A. W., and others.
The use and abuse of forceps. COMYNS BERKELEY, and others.
*Menorrhagia in young women without gross lesion. FAIRBAIRN, J. S.
The training of midwives. (Annotation.)

September 29, 1923

*Prenatal care and puerperal mortality. ROBINSON, A. L.
The diathermy treatment of gonorrhœa in women. MILNER, A. E., and MACLACHLAN, A. K.
The treatment of glycosuria in pregnancy. GRAHAM, G.

Acute Bacillus coli infection of the gastro-intestinal tract of a newly-born baby contracted from its mother. Jewesbury and Dudgeon point out that various infective conditions may occur at the ante- and post-natal period and during the birth of the child. They describe a case in which infection appears to have occurred during the intra-natal stage. The mother was

infected with a certain strain of *B. coli* which had produced two attacks of acute coli fever. The urine contained much pus and masses of bacilli, and the lochia were similarly infected. They believe the baby was infected at birth by swallowing the urine or lochia in which the organisms were abundantly present. This view is supported by the fact that the illness commenced about three days after birth, and the condition of the child at birth was perfectly satisfactory. The illness commenced and continued with gastro-intestinal symptoms. The child passed thick mucus by the bowel for some weeks and also vomited mucus. The causative organism was present in the intestinal mucus for many weeks, and 18 weeks from the inset of the illness it was present in the vomited material during a gastro-intestinal upset. The urine also showed a bacilluria due to the same organism. The illness was so severe that it nearly cost the life of the child and improvement only occurred after many weeks. Repeated examination failed to reveal the organism in the mother's milk. Jewesbury and Dudgeon consider that when dealing with women known to have coli infection, it would appear wise to take special care to cleanse the mouth of the child as soon as possible after birth with some non-irritant antiseptic solution, in a similar manner to which eyes are treated with silver nitrate solution when a gonococcal infection of the mother is present.

A case of quintuple pregnancy. A multipara, aged 33, who had had two children and one abortion was pregnant for the fourth time. The last menstruation ceased on May 26, 1922. She was first seen at the beginning of October, wasted, anæmic, and slightly jaundiced. The uterus reached to just below the umbilicus. No fœtal parts could be felt and no fœtal heart could be heard. No fœtal movements had been felt. Other signs of pregnancy were present. It was decided to empty the uterus, and a small rubber hydrostatic balloon was inserted into the lower uterine segment. After 24 hours it was replaced by gauze packing. Next day, on removal of the gauze, the os was almost completely dilated and a bag of membranes presenting. The membranes were ruptured and a small fœtus was extracted. Three more small fœtuses were removed in a similar manner. The placenta was removed manually. Attached to the placental mass by a long thin cord a small smooth body was found: it proved to be a monstrous embryo. The four children were all born alive but died within half an hour. All were females, three were perfectly formed; one was an anencephalic monster. Their lengths and weights were as follows:—(1) 29 cm., $15\frac{1}{4}$ oz.; (2) 30 cm., $15\frac{1}{2}$ oz.; (3) 28 cm., $13\frac{3}{4}$ oz.; (4) 23 cm., $9\frac{3}{4}$ oz. (anencephalic). The placenta weighed $15\frac{3}{4}$ oz. Four amniotic sacs could be recognized. Five umbilical cords were attached to the placenta. Four were of normal size and corresponded to the formed fœtuses; the fifth, attached to the small monster, was 1 mm. in diameter and $4\frac{1}{2}$ ins. in length. The puerperium was normal. A sister and a brother's wife had each had twins once—otherwise the family history was negative.

Should infant mortality be reduced? Wynne, who is the Medical Officer of Health for Sheffield, is convinced that "the thoughtless sentimental propaganda in favour of the unlimited production of babies, and their preservation, whether fit or unfit to survive, should be sternly discouraged by all who take public health work seriously."

The treatment of syphilis in the woman of child-bearing age. Rorke considers that the treatment of syphilis in women during pregnancy is practically the same as at other times, namely, by arsenic and mercury. The standard of cure is a persistently negative Wassermann reaction over two years without sign or symptom, even after a provocative injection has been given. She emphasises the necessity for the careful investigation of all cases of possible conceptional syphilis. With a history of stillborn or weakly children and with no toxæmia of pregnancy or obvious disease of either parent, the possibility of conceptional syphilis must be borne in mind; the results of treatment far outweigh any slight inconvenience.

Marriage, pregnancy, parturition and tuberculosis. Writing as a Tuberculosis Officer, Ward finds that a tuberculous woman loses nothing by marriage alone, as it is unlikely to affect her, but if it does affect her it is more than twice as likely to improve her condition as to cause deterioration. Pregnancy and parturition are likely to make her worse, there being a 50 per cent. chance of this against a 19 per cent. chance of improvement. The children are seven times as likely to be tuberculous as those of healthy people.

Patients who ask for advice regarding marriage will not take it unless it coincides with their wishes. A woman with major tuberculosis should not bear children. As regards lactation, if milk is available it is wise for a tuberculous woman to breast-feed the child for six weeks or longer, but never longer than eight months, and always with precautions if infective.

Menorrhagia in young women without gross lesions. Fairbairn sums up the treatment of these difficult cases thus. Reliance must be placed chiefly on general and hygienic management of the patient, especially in regard to removing unfavourable conditions of life and occupation and promoting good physique. Curetting is of little use as a therapeutic measure, being more often required for diagnosis in patients after the age of 25 to 30 than in younger women.

Drugs are rarely of use except perhaps sedatives when there is nervous and psychical disturbance. The organ extracts are occasionally of use, but further investigation will be necessary before a scientific basis is obtained for their administration.

Prenatal care and puerperal mortality. Robinson shows how the majority of maternal deaths in childbirth are preventable by modern prenatal methods, notwithstanding which there has been no appreciable reduction in the maternal mortality of childbirth during the last fifty years. This, he considers, is due to the fact that the majority of pregnant women receive no prenatal examination, and are thus deprived of the advantages of modern treatment.

The treatment of glycosuria in pregnancy. Graham points out that a reducing substance in the urine of a pregnant woman may be lactose, lævulose, pentose or homogentisic acid in addition to dextrose. He discusses the differential diagnosis of these reducing substances.

Where dextrose is found, it may be due to exophthalmic goitre, acromegaly, renal glycosuria, temporary diminution of sugar tolerance, or true diabetes mellitus.

Renal glycosuria, recognizable by blood sugar estimation, requires no treatment. Temporary diminution of sugar tolerance, which can only be diagnosed with certainty by blood sugar estimations at intervals after a dose of 20 to 50 gr. of dextrose. The course which this condition runs is almost invariably favourable, the sugar disappears from the urine after the child is born, but may reappear during the next pregnancy. The patient needs careful watching; the total output of sugar should be estimated and the carbohydrate reduced. When the sugar disappears the diet should be gradually increased and an occasional blood sugar estimation determined. This procedure may be modified by the use of 5 or 10 units of insulin.

For true diabetes mellitus the full régime of diabetic treatment will be required, but insulin will considerably alter the accepted treatment. The question of the termination of pregnancy must be carefully considered. If near term it is better to treat the diabetes energetically and allow the pregnancy to continue. If the disease has started early in pregnancy it may be better to terminate it, though this will depend on the severity of the attack and the response to treatment. F. E. T.

British Medical Journal.

July 7, 1923.

*Observations on fifty cases of carcinoma of the cervix treated with radium. M. DONALDSON and R. G. CANTI.

July 21, 1923.

Dystocia due to shortening of the umbilical cord. J. MCLEISH.

August 11, 1923.

Sterilization of mental defectives. R. A. GIBBON.

August 25, 1923.

*Cow's milk in infant feeding. R. J. BLACKHAM.

*Incontinence of urine after childbirth. W. F. SOMERVILLE.

September 1, 1923.

The teaching of obstetrics and gynæcology. J. S. FAIRBAIRN.

September 8, 1923.

*The treatment of acute salpingitis. A. W. BOURNE, V. BONNEY, W. B. BELL, and L. PHILLIPS.

Observations on innervation of the uterus. B. WHITEHOUSE and H. FEATHERSTONE.

*The treatment of severe uterine hæmorrhage by radium. S. FORSDIKE.

Menorrhagia treated by intensive X-ray therapy. L. MARTINDALE.

September 13, 1923.

*Conservative gynæcology. A. E. GILES.

A " privy " birth. W. B. LEWIS.

The training of midwives : Dr. Janet Campbell's Report. (General Article.)

The innervation of the uterus. F. COOK. (Correspondence.)

September 22, 1923.

Pseudo-cyesis. D. S. PRACY.
Wandering spleen impacted in the pelvis. A. J. V. BETTS.
The Work of the Maternity Department. (The Week.)

September 29, 1923.

Unusual position of a child during delivery. W. F. MOORE.

Fifty cases of carcinoma of the cervix treated with radium Donaldson and Canti were lent 324 mgm. of radium by the Medical Research Council for eighteen months for purposes of research only, and applied it to the study of the clinical and pathological changes produced by radium applied locally in carcinoma of the cervix. They summarize their results thus :—

Clinical.

(1) These are in accord with the general exerience of others in recent years, that in the majority of cases patients suffering from carcinoma of the cervix cease to have hæmorrhage, vaginal discharge and ulceration after treatment with radium. In some inoperable cases life is prolonged, the patients being enabled to lead useful existences. It would be premature at present to speak of cures.

(2) That the preliminary application of radium in operable cases causes the disappearance of fungating growths or ulcer so that the risk of infection and of implanting new growths from the cervix when incising the vaginal wall is greatly diminished.

(3) The application of 173.6 mgm. of radium element for 24 hours is much more efficient than the same amount given for eight hours on three occasions.

(4) Since histological evidence of the efficacy of Dael's method of irradiation of the pelvic glands is impracticable, its value is still *sub judice,* as it depends on clinical evidence.

Histological.

(1) The introduction of 173.6 mgm. of radium element into the cervical tissue is capable of causing complete disappearance of the growth within a few weeks, whereas the same application for eight hours produces little or no effect.

(2) Definite series of changes in the carcinoma cells can be demonstrated after irradiation, leading up to destruction of the cell.

(3) Little or no effect was produced in affected iliac glands by irradiating the cervix.

(4) Since changes in the malignant cells take place before the formation of fibrous tissue the latter cannot be the causal agent in the disappearance of the growth.

(5) The carcinoma cells are more vulnerable than the uterine musculature, and in the latter local atrophy and fibrosis take place at a later date.

Cow's milk in infant feeding. Blackham points out that there are three schools of thought on the use of cow's milk in infant feeding, namely, the fresh milk school, the condensed milk school, and the dried milk school. That he himself is an adherent of the dried milk school is shown by the statement that his personal experience has been gained chiefly in hot countries where milk is more putrescible, more sophisticated and even

more liable to contamination than in temperate climates. Under such conditions one has turned gratefully, he says, from the " white sewage " of the bazaars to the comparatively sterile milk powders.

Incontinence of urine after childbirth. Somerville confidently recommends electric treatment for incontinence of urine after childbirth. The application of a continuous current of three to five milli-amperes for three to five minutes through an appropriate copper electrode introduced into the urinary canal and repeated on alternate days for one or two weeks, is recommended.

The treatment of acute salpingitis. In a discussion on the treatment of acute salpingitis before the British Medical Association the introductory papers were read by Bourne, Bonney, Blair Bell and Phillips. Bourne pointed out that the cardinal lesions requiring treatment are : (*a*) suppurative inflammation of the tubes, and later, of the ovaries, and (*b*) suppurative pelvic peritonitis, and that being inseparable, these two conditions cannot be regarded independently. The first object of treatment is to arrest the acute disease and to prevent its extension to the abdominal cavity proper, the second to prevent the formation of chronic sequelæ such as pelvic peritonitis, interstitial salpingitis, pyosalpinx, etc., and the third to enable the affected tube to resolve sufficiently to resume its normal function. The ideal is to arrest the destructive inflammatory process at the earliest possible moment. It is important to operate as soon as the diagnosis of suppurative salpingitis is made.

Bonney stated that for many years he had advocated operating on all cases of salpingitis at the earliest possible moment. He asks : Is an inflamed tube capable of recovering its function, and, if so, is the likelihood of such recovery considerable or small? and considers that evidence as to the subsequent value of tubes that have been inflamed is badly wanted.

Blair Bell believes that the tube often recovers entirely or to such an extent that salpingotomy is not required until the acute stage has long subsided, and that operation during the acute or subacute stage of streptococcal salpingitis is dangerous. In acute salpingitis in which the presence of pus in the pelvis demands interference he limits operative procedures to posterior colpotomy.

Phillips supports the view that the tubes should be conserved in acute salpingitis, the reconstructive operations being (*a*) salpingostomy, (*b*) partial salpingectomy, (*c*) resection and anastomosis, and (*d*) incision and re-suture after canalization.

In the discussion Oldfield, Campbell, Johnstone, Gilmour Currier (U.S.A.), Rivett and Hendry took part and Bourne in reply said that the question turned upon the desirability of early operation, and if early operation were practised, upon the proper procedure to be carried out. The discussion confirmed the wisdom of early operation, and the evidence of Phillips on the results of plastic operation on the chronic tube provided valuable support for the preservation of the acute suppurating tube by salpingostomy. The drainage tube should be removed after one or two days, thus preventing the formation of adhesions.

The treatment of severe uterine hæmorrhage by radium. Forsdike asserts that radium arrests uterine hæmorrhage solely through its action on the endometrium. A prolapsed ovary lying near the uterus would be diagnosed, and if the condition of the patient was imperative the exposure to radium

should be given with the certainty that the ovary would be affected, whereas pelvic inflammation negatives the use of radium.

Conservative gynæcology. In this thoughtful address Giles emphasizes the fact that preservation of organs is of little use unless it goes hand in hand with preservation of function. The functions which must be preserved whenever possible are, in order of importance, child-bearing, the ovarian function, menstruation and the marital function. The significance of these is discussed, and the author then reviews in turn the conservative surgery of the ovaries, of the tubes and of the uterus, and shows with many apt illustrations how surgery is able to adapt itself in these conditions to the demands for conservation not of structure only but also of function.

F. E. T.

The Medical Journal of Australia.

January 13, 1923, Vol. I, No. 2.

Infant feeding. MORRIS, E. S.

A dietetic survey of infants. BEARE, F. H.

A case of malignant ovarian cyst with involvement of appendix. BRYANT, A. L.

February 3, 1923, Vol. I, No. 5.

*The aims and ideals of antenatal work. WILSON, A. M.

*Antenatal care. CHAMBERS, R. W.

*Antenatal notes. FOWLER, R.

February 17, 1923, Vol. I, No. 7.

*Puerperal sepsis. LIPSCOMB, T. W.

Vesico-vaginal fistula. ARMSTRONG, G.

The infant foods standards. (Leading Article.)

February 24, 1923, Vol. I, No. 3.

Some gynæcological experiences in Southern Manchuria. KRAKOWSKY, A. N.

March 10, 1923, Vol. I, No. 10.

The maternity bonus. (Leading Article.)

April 7, 1923, Vol. I, No. 14.

The placenta of the Lizard Tiliqua Scincoides. (Current Comment.)

April 21, 1923, Vol. I, No. 16.

The Queensland Maternity Hospital Scheme. (Leading Article.)

April 28, 1923, Vol. I, No. 17.

Radium therapy: experimental research work in, including death, retardation of life, growth, prolongation of life, determination of sex, sterilization and artificial parthenogenesis, reproduction without the male. LAWRENCE, H.

*Bilateral detachment of the retina in nephritis of pregnancy: re-attachment of retina. GARDNER, M.

The treatment of syphilis in pregnant women. (Current Comment.)

May 5, 1923, Vol. I, No. 18.

*Puerperal infection; ligature or excision of veins. NYULASY, A. J.

June 2, 1923, Vol. I. No. 22
Cæsarean section and hysterectomy in a patient with contracted pelvis and occipito-posterior presentation. DONOVAN, H. C. E.

June 9, 1923, Vol. I, No. 23.
The lipoids of maternal and fœtal blood at the conclusion of labour. (Current Comment.)

June 16, 1923, Vol. I, No. 24.
Occipito-posterior presentations. JAEKE, C. H. (Correspondence.)

June 30, 1923, Vol. I, No. 26.
A University Chair of Midwifery. PURDY, J. S. (Correspondence.)

The aims and ideals of antenatal work. Wilson points out that in 1919-20 the mortality from childbirth in Victoria was recorded as 4 per cent. and that this figure probably under-estimates the actual percentage, as many deaths, either directly or indirectly due to the confinement, are registered as occurring under other conditions. Also 6 per cent. of all babies born were stillborn or did not survive the first month. Of the infants that survive many are seriously handicapped by hereditary taints and birth injuries; the former including the disability of the congenital syphilitic and the defective vision from gonorrhœal ophthalmia, and the latter the injuries of the nervous system (both central and peripheral), giving rise to paralysis, mental deficiency and epilepsy.

The general principles of management of the pregnant woman are discussed and attention is then focussed on the toxæmias of pregnancy, to which one-third to one-half of the maternal mortality and one-twelfth of the fœtal mortality is ascribed. With efficient antenatal care the deaths due to the toxæmias should be materially reduced.

Antenatal care. Chambers discusses the value of antenatal care with special regard to pelvic obstruction. He points out that a careful examination during pregnancy will save many tedious labours, with the added risk of numerous vaginal examinations, unsuccessful attempts at delivery, marked laceration of the pelvic floor, and the very much greater risk of subsequent sepsis. It will also decrease the number of stillborn children, birth palsies and mentally deficient children.

Antenatal notes. Experience of antenatal work in Melbourne suggests the maladies which need emphasis are the venereal diseases, pyelitis and cardiopathy. The gravity of heart disease in pregnancy is shown by the fact that of five patients seen within six months three died undelivered.

Puerperal sepsis. Lipscomb points out that there is still no statute in Australia for the registration and supervision of midwives. He considers that it is not too much to expect that the lessening of maternal morbidity and mortality that has followed such legislation in other parts of the world would also occur there.

Bilateral detachment of the retina in nephritis of pregnancy; re-attachment of retina. Gardner records the case of a woman, aged 33, who had passed

through three normal pregnancies without any previous eye troubles. At the sixth month of her fourth pregnancy there was œdema of the lungs, conjunctiva and lids. The blood pressure was 190 to 220 mm. of mercury. The urine was scanty with much albumen and many casts. There was almost complete detachment of both retinæ. The detachments could be seen by oblique illumination. Hand movements could be detected, but fingers could not be counted. Projection of light was imperfect. Both optic discs were very œdematous, as was also the small amount of undetached retina in each eye round the optic discs. The œdema extended to the macula. There were no hæmorrhages. A small amount of "cotton wool" exudate was seen near the vessels.

Cæsarean section was performed under spinal anæsthesia, the patient being too collapsed for Porro's operation. Convalescence was uneventful. Vision was completely restored, the fields of vision becoming quite full in each eye. There were no scotomata and the papillœdema has disappeared. The detached retina has become completely re-attached, although the remains of the exudate and hæmorrhages are still to be seen.

Puerperal infection; ligature or excision of veins. The remarkable success following ligation of the ovarian veins in a grave case of puerperal infection by Jellett suggests that this procedure has a valuable place in the surgical treatment of puerperal infection. Nyulasy records a case in which he considers the result to be so striking as to be almost dramatic in its effect.

F. E. T.

The Medical Journal of South Africa.

Vol. xviii, No. 6, *January*, 1923.

Some points in plastic vaginal surgery. GRANT, W. G

Vol. xviii, No. 7, *February*, 1923.

*Post-partum hæmorrhage. ABELHEIM, A.

Vol. xviii, No. 8, *March*, 1923.

The use of simple cow's milk mixtures in infant feeding. BAUMANN, E. P.

Post-partum hæmorrhage. Abelheim considers that the simplest and most effectual way of treating cases of hæmorrhage where the placenta has been removed and bleeding occurs through an atonic state of the uterus or through a tear of the cervix is compression of the aorta with the fist, or better, with an indiarubber tube tied round the waist, as advocated by Momburg, having employed this method several times with success.

He is also of opinion that there are more cases of hæmorrhage from torn cervix since the universal use of pituitrin in confinements. He has had unsatisfactory results from stitching up the cervix and advocates the double compression method. The uterus being empty is anteflexed or pushed deeply into the pelvis with the right hand, whilst the left hand grasps the vulva, pressing the large labia tightly together and pushes upwards as if to push the whole pelvic floor upwards into the pelvic cavity, the vulva being pressed together so tightly that no blood can flow out. F. E. T.

American Journal of Obstetrics and Gynæcology.

Vol. 6, No. 4, *October*, 1923.

Cystocele and high rectocele. T. J. WATKINS.

*Relation between placenta and the secretion of milk. OSKAR FRANKL.

*Follow-up results of 908 cases of uterine cancer treated by radium. H. BAILEY and W. HEALEY.

*Contributions to the pathology of vulvar diseases. F. TAUSSIG.

Prevention of fœtal asphyxia. R. BARTOLOMEW.

The calcium and magnesium content of the blood serum during pregnancy, labour, and the puerperium. E. PLASS and J. BORGET.

[An outline of post-partum care. H. THOMS.]

[The feeding of placental extracts to mothers; its effects upon breast-fed infants. S. ABRAMS.]

[Painless childbirth by synergistic methods. J. GWATHMEY, E. DONOVAN, J. O'REAGAN, and L. COWAN.]

[Germicides for use upon the skin. ELLICE MCDONALD.]

[Dystocia in an eclamptic due to a cystic hygroma of the pectoral region of the fœtus. F. IIAMS.]

*Tuberculous ovarian cysts with a report of a third case observed by the author. G. MOENCH.

N.B.—The articles in brackets could not be abstracted because several pages of each have been omitted by the printers.—W. W. K.

Selected abstract: Infection of internal genitalia.

Relation between placenta and the secretion of milk. In spite of many investigations and studies the question of the relationship of the placenta to lactation has remained an unsolved problem. Prof. Oskar Frankl has tried to throw light upon the problem by engrafting placental tissue under the skin of pregnant mice. Some of the grafts lived for sufficient time for parturition to take place, and, under normal circumstances, for lactation to have become well established. The litter sucked normally but gradually died of starvation when it was found that the maternal mammæ were only secreting colostrum and not milk.

The author's deduction is, therefore, that a successful transplantation of placenta into a pregnant animal causes the persistence of colostrum and the inhibition of the secretion of true milk.

In the discussion which followed the paper, which was read before the American Gynæcological Association, the pertinent question of the inhibition of milk secretion by the non-specific action of the placental protein, was raised by several speakers. Others called attention to the increase in the milk flow which is said to follow the injection of placental extracts.

Prof. Frankl, in his reply, made no attempt to meet the first objection, but in answer to the second he said that he was not convinced that placental extract did act as a galactogoge.

Follow-up results of 908 cases of uterine cancer treated by radium. This article is too statistical for abstraction. It includes many recent cases, but of those treated over five years ago just over one per cent. are known to be alive.

Contributions to the pathology of vulvar diseases. Taussig records cases of angiomatous tumours of the vulva, abscess of the clitoris and granuloma inguinale. The major portion of the paper is, however, taken up with an

account of leucoplakia of the vulva in which he analyzses the pathology and symptoms of forty cases. His conclusions correspond with those published by Berkeley and Bonney 14 years ago, but, as is not unusual with American writers, no reference is made to their classic contribution to the pathology of leucoplakia of the vulva.

Tuberculous ovarian cysts, with a report of a third case observed by the author. Those who are interested in tuberculous deposits in ovarian neoplasms may find the very long bibliography published by Moench of value. He has collected thirty-three instances of this coincidence, and adds the report of an additional one which he has recently observed.

Vol. vi, No. 2, *August*, 1923.

The Olshausen operation for suspension of the uterus. WILLIAM P. GRAVES.
The sociological responsibility of obstetrics and gynæcology. O. PAUL HUMPSTONE.
*Changes in the uterine vessels during pregnancy. O. H. SCHWARZ and F. P. MCNALLEY.
The treatment of benign uterine hæmorrhage by irradiation. W. C. DANFORTH.
Resuscitation in abdominal surgery. W. WAYNE BABCOCK.
The incidence of cervical erosion following normal childbirth and results obtained with the Dickinson method of treatment. WM. KERWIN.
The diagnosis of border-line obstetrics. GEORGE CLARK MOSHER.
*Nephrolithiasis and pregnancy. AIME PAUL HEINECK.
*Report of a case of endometritis decidualis polyposa. EARL C. SAGE.
Selected Abstracts—Abortion.

Changes in the uterine vessels during pregnancy. The authors have found changes in the intima of the arteries in antepartum uteri which are similar to those described by Goodall in his study of uterine involution. They suggest that the narrowing of the vessel lumina brought about by the intimal swelling may be a factor in the production of premature separation of the placenta, but there is little fact to support their theory.

Nephrolithiasis and pregnancy. Heineck draws some general conclusions from a study of the effects of removal of renal calculi during pregnancy, and of the effects upon pregnancy of nephrolithiasis prior to gestation.

If the symptoms are not severe operation should be postponed until after labour; but if they are such as to demand treatment the operative indications will be those governing renal calculi in general.

Operation for the removal of calculi during the latter half of pregnancy may bring on premature labour, but during the first five months it appears to be relatively safe.

Previous nephrectomy does not appear to have any evil influence upon a subsequent gestation, and does not, as has been suggested, tend to cause eclampsia.

Report of a case of endometritis decidualis polyposa. The specimen here reported as one of decidual endometritis was passed per vaginam by a woman who had been diagnosed as pregnant some months previously. Irregular hæmorrhages followed and she was finally admitted to hospital as suffering

from a " myoma." After a good deal of pain she passed a heart-shaped mass measuring four inches by three inches, the inner surface of which was studded with dark red polypoid projections. Sections showed chorionic villi, blood clot, decidual and epitheloid cells. The villi were surrounded by effused blood.

The specimen appears to be one which in this country we should describe as a carneous mole.

Vol. vi, No. 3, *September*, 1923.

*Further studies in autotransplantation of endometrial tissue in the rabbit. VICTOR C. JACOBSON.

Acid base equilibrium in pregnancy and the newborn. A. C. WILLIAMSON.

The broader aspects of the birth control propaganda as it should interest the physician. GEO. W. KOSMAK.

Prenatal care as viewed from the public health standpoint. RALPH W. LOBENSTINE.

Control of midwives. HAROLD BAILEY.

The treatment of pelvic infections in women. E. W. HOLLADAY.

Pelvic inflammations, their etiology and pathology. ISIDOR KROSS.

The utility of digital dilatation of the cervix. PAUL T. HARPER.

*Manual extraction of the placenta. THOS. R. GOETHALS.

Lactation atrophy of the uterus. HELIODOR SCHILLER.

What I have learned from my 106 Cæsareans. STANLEY PERKINS WARREN.

*Puerperal sepsis (bacteremia) caused by *B. influenzae*. WILLIAM THALHIMER and BEATRICE M. HOGAN.

Stricture of the œsophagus occurring during pregnancy. PORTER VINSON.

A case of sexual precocity. HERBERT THOMS and A. A. HERSHMAN.

Selected Abstracts—Syphilis and tuberculosis in pregnant women.

Further studies in autotransplantation of endometrial tissue in the rabbit. In an investigation of the hypothesis advanced by Sampson as to the origin of hæmatomata of Müllerian type in the ovary, the author devised some experiments with the object of implanting scrapings of endometrium upon the peritoneum of rabbits. The results of the first series (already published) were open to objection on account of the small number of animals used in the experiment, and the comparatively short time (70 days) which elapsed before they were killed.

In the second series, which Jacobson now reports, 15 rabbits were subjected to autotransplantation of scrapings of endometrium which were placed in the peritoneal cavity. On killing the animals after 150 days the grafts were usually found to have attached themselves to the broad ligament and not to the abdominal wall or mesentery. They formed cysts which resembled multilocular cyst-adenomata of the ovary. No true hæmorrhagic blood cysts were seen.

Removal of the ovaries at the time of making the transplants did not prevent their growth, but they were much smaller and had thinner walls. It does not follow that the growth of endometrial grafts is independent of the internal secretion of the ovaries, for enough ovarian hormone might have been circulating to allow of the modified growth described. Nevertheless it is to be hoped that the author will investigate this aspect of the question more fully.

Puerperal sepsis (bacteremia) caused by B. influenzæ. The authors state that they have been able to find only three other recorded cases in which this organism has been proved to be the cause of puerperal infection. They report the following case :—

Three years previous to admission the patient had had influenza which was followed consecutively by appendicitis, middle ear suppuration and attacks of abdominal pain in the upper abdomen. Two days after a simple low forceps delivery she had a rigor which proved to be the first of many. Blood and uterine cultures were made, and in both the influenza bacillus was grown. She developed a left parametritis which gradually cleared up. Several blood transfusions were performed and the authors were satisfied that definite improvement resulted therefrom. The patient recovered after a prolonged illness.

Manual extraction of the placenta. Goethals rightly regards manual removal of the placenta as a very dangerous proceeding. His chief fear is that placenta accreta may be encountered, in which case the patient's life may be rapidly endangered by shock and hæmorrhage.

The author assumes the presence of placenta accreta in three cases out of nearly 25,000 deliveries at the Boston Lying-in Hospital, but in no case was any pathological examination undertaken. The diagnosis rested upon the fact that the placenta was very adherent.

There is no method by which this complication can be diagnosed until the operator actually begins his attempt to remove the densely adherent mass. Any difficulty should be the signal for the abandonment of any further efforts to remove the placenta, and the uterine cavity should be tightly packed with gauze until arrangements can be made for hysterectomy.

Vol. vi, No. 1, *July*, 1923.

Some fundamental elements in the advancement of medicine. JOHN A. SAMPSON.

Radiography of closed Fallopian tubes. WILLIAM T. KENNEDY.

Desiccated ovary; its use, preparation and a suggestion as to a method of standardization. HERMAN SHARLIT, JAMES A. CORCADEN, and WM. G. LYLE.

The limitations of radiotherapy in the management of fibromyoma of the uterus. JAMES ALBERT CORSCADEN.

*Dextroversion of the uterus, with congenital absence of left Fallopian tube, ovary, broad ligament, round ligament, kidney and ureter. WALTER T. DANNREUTHER.

Insufflation of uterus and Fallopian tubes. ALBERT H. ALDRIDGE.

*Fibroid tumours complicating pregnancy and their treatment. GEO. W. KOSMAK.

The processes of tubal pregnancy. ELLICE MCDONALD.

Uterine carcinoma and its treatment by continuous low heat. JAMES F. PERCY.

Hæmorrhages in the newborn. LUCIUS A. WING.

Collective Review.—Views of primitive peoples concerning the care of cord and placenta. JONATHAN WRIGHT.

Dextroversion of the uterus with congenital absence of left Fallopian tube, ovary, broad ligament, round ligament, kidney and ureter. Dannreuther has put all

his information into the title of his report, and, from his account of this rare abnormality, his conclusions appear to be justified.

The maldevelopment was discovered in the course of an operation for appendicitis.

Fibroid tumours complicating pregnancy and their treatment. Kosmak considers that necrobiosis of myomata in pregnancy can be recognized by the presence of fever and an increased white-cell count. The only treatment which he recognizes is myomectomy or hysterectomy.

Where a tumour is situated in the lower uterine segment, operative interference should be considered if it fails to rise out of the pelvis during the last two weeks before labour.

Myomectomy during pregnancy is safe and there is no fear of rupture of the scar provided infection does not take place.

The author emphasizes the necessity of early operation upon infected myomata in the puerperium.

The dangers of the induction of abortion for myomata are pointed out, but hysterectomy, "if necessary," is advocated. W. W. KING.

Surgery, Gynæcology and Obstetrics.

Vol. xxxvii, No. 1, *July*, 1923.

Post-operative ventral hernia. MASSON, J.

Rare malformation of the vulva. RONCHESE, F.

*Endotheliomata of the uterus. MURPHY, D. P.

*Syphilis of the uterus and adnexa. PORTIS, B.

*Placental iron and its relation to icterus neonatorum. WILLIAMSON, D. C.

Vol. xxxvii, No. 2, *August*, 1923.

Congenital rectal stricture as the cause of infantile megacolon. DAVID, V. C.

*Hysterectomy in certain cases of pulmonary tuberculosis; particularly as an alternative for therapeutic abortion. BALDWIN, J. F.

*Blood-pressure in the new-born following normal and pathological labour. REIS, R., and CHALOUPKA, A. J.

Vol. xxxvii, No. 3, *September*, 1923.

*Ovarian hæmatomata. BLAIR, E. M.

Endotheliomata of the uterus. This paper is summarized as follows:—

(1) The point of origin and the exact classification of the endotheliomata are still considered doubtful by many investigators.

(2) The writer feels that the term is sufficient and should be used.

(3) Of the female pelvic organs the ovary is the most frequent seat of growth, and the uterus is more often attacked than the literature would indicate.

(4) Pre-operative clinical diagnoses have never been made.

(5) The gross specimen removed at operation has no pathognomonic characteristics.

(6) The diagnosis rests entirely upon the histological picture.

(7) The uterine endothelioma is highly malignant and is frequently metastatic.

(8) The treatment is that of malignancy.

(9) The period of greatest incidence is between the ages of 30 and 40.

(10) The most frequent symptom is hæmorrhage.

(11) The cervix is attacked more frequently than the fundus.

(12) Endotheliomatous degeneration of pre-existing myomata is not infrequent.

(13) The mortality rate is high.

(14) A case of endothelioma of the uterus is presented.

Syphilis of the uterus and adnexa. Portis's review of syphilis of the uterus and adnexa is thus summarized :—

Syphilis of the body of the uterus is rare. For most of the lesions which have been described as luetic the specific character has not been definitely established and appears doubtful. Gummata have been reported; these lesions may probably be accepted as luetic in spite of the fact that treponemas have not been demonstrated in them.

A case of early diffuse syphilitic involvement of the body of the uterus is described. The character of the process was established by the presence of the specific organism in the cellular tissue which separates the muscle bundles.

The lesion of the body was apparently secondary to a chancre of the cervix. Involvement of the body probably occurred by direct interstitial invasion from the primary lesion.

Adnexal lesions, the syphilitic character of which has been definitely proven, are even rarer than those of the body of the uterus. Chronic vascular and diffuse fibrotic processes have been reported as of luetic origin, but most of these must be excluded because of lack of evidence.

In the case reported, a corpus luteum and the surrounding stroma of the ovary were the seat of lymphocytic infiltration. Treponemas were present in this tissue, establishing the specific character of the inflammatory process.

That the involvement of the body of the uterus and of the ovary occurred early is indicated, not only by the cellular character of the inflammatory reaction, but also by the development of typical secondary cutaneous syphilides seven weeks after the onset of the first local symptoms. The blood Wassermann reaction was strongly positive when the skin lesions appeared. The age of the patient, a previously normal child-bearing history, vaginal bleeding, and the gross appearance of the cervix on direct visual examination led to a diagnosis of epithelioma of the cervix.

Placental iron and its relationship to icterus neonatorum. Regarding the relationship of placental iron to icterus neonatorum, Williamson draws the following conclusions :—

(1) All new-born infants have bilirubinæmia corresponding to the iron content of the placenta.

(2) There is a definite relationship between icterus neonatorum and placental iron content, the greater the placental iron content the greater the clinical jaundice.

(3) Jaundice of the new-born may thus be considered as purely dynamic or hæmolytic in origin.

(4) The non-icteric infants, all of whom nevertheless have a certain degree of bilirubinæmia, are without jaundice because their placental iron content is below the level necessary for the appearance of jaundice.

Hysterectomy in certain cases of pulmonary tuberculosis. Baldwin considers that in properly selected cases of pulmonary tuberculosis with pregnancy

as a complication, or relatively too profuse or frequent menstruation, particularly in the presence of traumatism from child-bearing or uterine hyperplasia, a panhysterectomy, with, as a rule, saving of the appendages if the patient is young, will remove a most serious handicap and give the patient the best possible opportunity to attain recovery from the primary disease.

Blood-pressure in the new-born. The writers conclude that :—

(1) The average systolic blood-pressure during the first day of life in full-term infants, following normal spontaneous labour, is 43 millimetres mercury.

(2) The blood-pressure increases daily until, on the tenth day, the average systolic blood-pressure is 78 millimetres.

(3) The greatest rise is during the first three days, reaching 59 millimetres on the fourth day.

(4) The blood-pressure varies with the birth weight, being higher in heavier infants.

(5) Sex, jaundice, pulse-rate and temperature, and caput succedaneum, with no sign of compression, apparently have no influence on the blood-pressure.

(6) Infants delivered by abdominal Cæsarean section have normal blood-pressure.

(7) Premature infants have low systolic blood pressures corresponding to the length of gestation.

(8) Twins have low blood pressure readings proportional to the prematurity and birth-weight.

(9) The greatest increase in blood-pressure is shown after midplane forceps extraction and version extraction; lesser increases were shown after low forceps extractions, relatively dry labours, prolonged second stages, and in infants with large cephalic measurements.

(10) The increased blood-pressures found seem to be due directly to increased trauma to the fœtal head.

Ovarian Hæmatomata. Blair points out that hæmorrhages from the ovary have until recent years received little attention and concludes that :—

(1) Perforating and especially recurrently perforating hæmorrhages of the ovary are probably all developmental uterine epithelium implantations.

(2) The great majority of hæmatomata that do not perforate but may still cause menstrual symptoms and abdominal pain are follicular, corpus luteum, or stromal in origin.

(3) The same stimuli needed to carry follicular, corpus luteum and stromal cysts of the ovary on to pathological entities act on implanted uterine epithelium to carry it on to mature endometrial tissue, cyst formation and perforation.

(4) Recurrent attacks of abdominal pain in the female pelvis during the child-bearing period may simulate appendicitis but be caused by a recurrently perforating hæmatoma of the ovary of endometrial origin.

(5) Sampson's theory of origin of perforating ovarian hæmatomata while still without substantiation, is a plausible theory. In view of that fact attention should be drawn to the added complication which may arise from a uterus in mal-position. F. E. T.

The Journal of the American Medical Association.

Vol. 80, No. 22, *June* 2, 1923.

Congenital absence of uterus and vagina. G. J. FERREIRA.

Vol. 80, No. 23, *June* 9, 1923.

A clinical study of ectopic pregnancy. (Current Comment.)

Vol. 80, No. 24, *June* 16, 1923.

*Intra-uterine transmission of anthrax : report of a case. A. LITVACK and C. REGAN.

A case of papyraceous fœtus. J. L. MILLS.

Vol. 81, No. 1, *July* 7, 1923.

*Roentgenograms of the fœtal skeltton as a positive sign of pregnancy. I. F. STEIN and R. A. ARENS.

Vol. 81, No. 2, *July* 14, 1923.

Rupture of multilocular ovarian cyst. F. McK. BELL.

*True ovarian pregnancy. O. BROOKS and L. L. CHASPIER.

*Foreign body in the uterus twelve years with no symptoms. I. GLASSMAN.

Vol. 81, No. 3, *July* 21, 1923.

*The operation of a breast milk dairy. H. D. CHAPIN.

Vol. 81, No. 4, *July* 28, 1923.

*The ætiology of eclampsia. R. OFFENBERG.

Contraception : A British discussion. (Current Comment.)

Vol. 81, No. 5, *August* 4, 1923.

*Observations on the electric breast pump. I. A. ABT.

Vol. 81, No. 6, *August* 11, 1923.

*Pregnancy after interposition of the uterus. I. F. STEIN.

Vol. 81, No. 7, *August* 18, 1923.

*Ocular disturbances in pregnancy and during the puerperium. N. M. BLACK.

*Cæsarean section with hysterectomy for congenital malformation of vagina. J. E. CONUTZMAN and J. C. SUTER.

*Intra-cranial hæmorrhage in the newborn. W. SHARPE.

Care of the newborn in the first weeks of life. E. G. HUENCKENS.

Human colostrum. (Editorial.)

Intrauterine transmission of anthrax. The probability of the transmission of anthrax to the fœtus in pregnant animals following inoculation with anthrax was denied for many years until in 1882 Straus and Chamberland definitely proved that intra-uterine infection may be induced experimentally in animals. There are extremely few reports in the literature of anthrax occurring during pregnancy in the human subject. The authors report such a case. A married woman, aged 22, was admitted to hospital for probable anthrax which had commenced as a small papule on the left cheek two days before. She was six months pregnant. On admission she was not prostrate and did not seem to be dangerously ill although the blood stream contained large numbers of anthrax bacilli, as the blood culture taken at the time subsequently showed. Notwithstanding the administration of anthrax serum and the application of chloramine-T to the lesion the patient died. Smears and cultures taken after death from the heart, lungs,

liver, kidney, spleen and placenta showed characteristic anthrax bacilli. The uterus was opened with aseptic precautions and cultures from the heart, liver and amniotic fluid of the fœtus showed similar bacilli.

In discussing the mechanism of the transmission of the bacilli through the placenta the authors point out that whilst the placenta is an ideal filter and barrier against penetration of bacteria it cannot be relied on to withstand the attack of certain pathogenic bacteria such as anthrax. In the septicæmic form of the infectious diseases the integrity and impermeability of the placenta is often partially destroyed so as to admit the passage of invading organisms. The epithelium of the chorionic villi may, for example, lose its protective power, together with the general lowering of the resistance of the body cells. In anthrax particularly it would seem that this protection may be interfered with mechanically by gross injury of the cells, *e.g.*, by hæmorrhage and necrosis. In the non-septicæmic cases of anthrax the course of the pregnancy might not be interfered with, but in the limited statistics available the malady has usually assumed its most severe and fatal form.

Roentgenograms of the fœtal skeleton as a positive sign of pregnancy Stein and Arens show that :—

(1) In the second half of pregnancy fœtal Roentgenograms are of definite confirmative value : (*a*) in recognizing clinically obscure presentations and positions the Roentgenogram clinches the diagnosis; (*b*) in differential diagnosis between pregnancy and other abnormal enlargements the Roentgen-ray evidence is the deciding factor.

(2) By pneumo-peritoneum the gravid uterus can be quite typically shown on the film in the early months of pregnancy. This may be considered a probable sign of pregnancy. Its value in differential diagnosis is obvious.

(3) The demonstration of the fœtal skeleton by the Roentgen-ray is the only positive sign of pregnancy possibly obtainable before quickening.

True ovarian pregnancy. Brooks and Chaspier record a case of true ovarian pregnancy which is of interest not only because of the rarity of this condition (there being only 72 cases on record), but also because of the lack of symptomatology referable either to ovarian disease or to pregnancy, there being no pain or intermenstrual bleeding, and conception taking place in the presence of bilateral pyosalpinx. The majority of cases reported show definite symptoms pointing to ovarian disease, whereas the only symptom of any significance here is the rapid pulse. Anatomically, the relationship of tube, ovary and uterus was not greatly disturbed, and the tube with its fimbriated end could be distinguished easily from the ovary.

Foreign body in the uterus twelve years with no symptoms. Glassman records the case of a German housewife, aged 43, who had been married at 16, had four children, and had had no previous illness was referred for Roentgen-ray examination of the pelvis. Twelve years previously a gold stem pessary had been inserted into the cervix. It did not interfere with menstruation. Five months previous to the Roentgen-ray examination the patient complained of hot flushes and irregular menses, which were ascribed to the menopause. Two years previously a slight putrid discharge developed and cleared up under treatment. The presence of the pessary had been com-

pletely forgotten. The Roentgenological examination revealed to the right of the mid-line, embedded within the body of the uterus, the pessary with one stem, about $1\frac{3}{4}$ inches in length, pointing towards the right. The other stem pointed downwards along the lumen of the uterus towards the cervix. Abdominal hysterectomy was advocated.

The operation of a breast milk dairy. The New York Infant Welfare Federation started an experiment in 1921 to attempt to procure and distribute a certain amount of breast milk to aid in critical cases. The Health Stations of the Department of Health are utilized in procuring the milk. It is attempted to procure for a nominal price, from a given number of mothers, a quantity of breast milk that may be employed in supplying hospitals and private homes caring for premature and weak babies. No milk is taken unless it is expressed at the station. Only mothers who have more milk than is needed by their own babies are used. The baby has to be under the care of a physician and a nurse in the health station and the case must be recommended by them. A mother may come in once or twice a day. If she lives at a distance car fare is paid if she can give ten or more ounces. A record book is kept and each mother sees an entry made, recording the amount of milk she has given. The mother uses a small measuring glass when she is expressing the milk. All the milk is pooled and put in large bottles in ice. The supply is fluctuating as it is affected by many different factors, such as sickness of the mother or baby, company at home, bad weather and visits of relatives.

Every one buying the maternal milk is required to pasteurize it before use, as no Wassermann test has been done on the mothers. Dr. Parks, Director of the Laboratory of the Department of Health, decided that any possible danger would be eliminated if this precaution were taken.

Chapin considers that every locality having a maternity hospital or a community health centre should inaugurate a similar undertaking. Human milk, if procurable, can be as advantageously fed from a bottle as directly from the breast, and that any period of lactation can usually fit a baby of any age. It is especially during the first month or two that infant mortality may be materially reduced by this kind of effort.

The etiology of eclampsia. In these historical and critical notes Ottenberg draws attention to the recent contribution of McQuarrie in which it is suggested that the toxæmia of pregnancy may be due to the accidental transfusion of incompatible blood between mother and child as the result of a fortuitous opening in the placenta between the two circulations. Ottenberg states that in 1911 he had worked on the same idea and was about to publish a preliminary communication when, on reviewing the literature, he found a paper written by Dienst in 1905 which set forth the same theory and gave much evidence in support thereof. Although Dienst retracted this idea in 1908 and substituted another, Ottenberg still believes it to be correct and to offer the most plausible explanation of eclampsia. He thinks it seems within the range of possibility that in the presence of any of the warning symptoms of toxæmia a direct examination of the mother's blood by a suitable technique might reveal the presence of microscopic clumps of agglutinated red cells or perhaps phagocytosis of red cells, as was shown by Hopkins to occur in incompatible transfusions. He also thinks it possible that several other unexplained diseases, particularly jaundice of

the newborn and certain cases of hæmorrhagic disease of the newborn may also be due to the same cause, namely, accidental placental transfusion of incompatible blood.

Observations on the electric breast pump. Abt has devised an electrically driven reciprocating breast pump with vacuum chamber combined with a special glass nipple shield. It produces an intermittent form of suction without causing pain or injury to the breast. It stimulates the breast, increasing the quantity of milk. It has been tried extensively and gives better results than any artificial method previously employed.

Pregnancy after interposition of the uterus. Stein records four cases of pregnancy after interposition of the uterus and draws the following conclusions from them:—

(1) The Wertheim-Watkins operation of interposition is indicated chiefly in cases of prolapse of the uterus or bladder after the menopause. If performed during the child-bearing age effective sterilization must be ensured. Curettage as a part of the operation would ensure against the development of an existing pregnancy, as occurred in one of Weibel's cases.

(2) When pregnancy occurs after interposition, abdominal Cæsarean section at term is the only rational and safe treatment, and the operation should be supplemented by sterilization.

(3) The indication for Cæsarean section is purely a maternal one and therefore holds if the fœtus is dead.

Ocular disturbances in pregnancy and during the puerperium. Black points out that the early recognition of ocular disturbance during gestation is of great importance as they frequently are warnings of systemic changes harmful not only to sight but possibly to life.

The ocular disturbances liable to complicate pregnancy are: (1) the sudden amaurosis usually called anæmic; (2) the retinal change spoken of as albuminuric retinitis of pregnancy; (3) loss of vision without retinal lesion, sometimes with pallor of the disc; and (4) neuro-retinitis not resembling that called albuminuric.

The amaurosis of pregnancy is believed to be due to a sudden toxic saturation of the optic nerve and retina, retinal changes being absent because of insufficient time for them to develop. Optic atrophy sometimes follows uræmic amaurosis.

The term albuminuric retinitis has been superseded by retinitis of pregnancy. They usually occur together, although either albuminuric retinitis and retinitis of pregnancy may occur separately. The retinal disturbance is not a form of albuminuric retinitis although albuminuric retinitis may develop during pregnancy from a pre-existing chronic nephritis. The nephritis of pregnancy is a toxæmic degeneration, not a true inflammation.

The ophthalmic signs may not differ from those of other forms of neuritis. There is widespread neuro-retinitis with exudation and hæmorrhage. The neuritis is toxic rather than vascular in origin, although endarteritis with obliteration has been found in the choroidal vessels. These vascular changes are of a temporary nature. In retinitis of pregnancy prognosis depends on the duration of gestation. If it occurs during the first six months of pregnancy the pregnancy should be determined if sight is to be saved. Any serious eye lesion may be aggravated by subsequent

pregnancy. The induction of labour has been recommended as a therapeutic measure. On the termination of pregnancy the inflammatory deposits in the retina may be absorbed and good vision be restored, provided that the process has not continued so long that secondary changes have occurred.

Retinal hæmorrhages indicate a grave toxæmia. The life, future health and vision are best safeguarded by interruption of pregnancy. The vision rapidly improves after delivery and the exudation and hæmorrhage are absorbed. In extensive effusions, however, a certain amount of impairment is usual.

A true optic neuritis, that is papilloedema, is not infrequently found associated with the toxæmia of pregnancy.

Detachment of the retina occasionally occurs in pregnancy or in the puerperium and the chance of recovery of vision is better than in the non-puerperal state. The induction of labour may favour reattachment of the retina.

Cæsarean section with total hysterectomy necessitated by congenital malformation of the vagina. An unmarried woman, aged 28, was admitted to hospital in labour. On examination under an anæsthetic the external genitals had the appearance of virginity, the space between the labia majora being covered with mucous membrane. The urethral orifice was dilated, easily admitting the index finger.

Cæsarean hysterectomy was performed, a full-term child, weighing 7½ lbs., being delivered. When the uterus was removed a vaginal canal was found, normal in its upper part but ending abruptly with no outlet. Further examination revealed two small holes opening on the sides of the urethral orifice, each having the diameter of a small probe, 5 cm. in length, and opening into a blind vaginal pouch.

The patient had menstruated regularly and normally since the age of 15 years and apparently had no knowledge of any abnormality.

Intracranial hæmorrhage in the new-born. Sharpe points out that acute intracranial hæmorrhage and cerebral œdema of varying amounts occur rather frequently in the newborn. Lumbar puncture during the first week after birth may be used to demonstrate the presence or absence of free blood in the cerebrospinal fluid. If present absorption can be aided by repeated lumbar puncture and spinal drainage: if not present intracranial hæmorrhage can be excluded. The mildness of signs and symptoms of even extensive intracranial hæmorrhage and cerebral œdema in the newborn emphasize the importance of early lumbar puncture, both as a diagnostic and therapeutic measure in any suspected case of intracranial lesion in the newborn, irrespective of the type of labour. The early recognition of intracranial hæmorrhage in the newborn and its appropriate treatment will tend to lessen that large chronic group of physically impaired and mentally retarded children. F. E. T.

La Gynécologie.

June, 1923.

*On external and internal hæmorrhages from uterine fibromata. Professor TEDENAT.

*A comparative study of nodular salpingitis and of nodular malformation of the uterine horns. AUREL BABES and LUCIE COULLURI.

On external and internal hæmorrhages from uterine fibromata. Tedenat describes and compares the chief dangers of sub-serous and sub-mucosa fibromata, showing that the site of the tumour in relation to the uterine wall is of greater consequence than its volume. A sub-serous fibroma may become extremely large without causing sanguinary loss, leading instead to periods of amenorrhœa, which may give rise to a mistaken diagnosis of pregnancy. The chief danger lies in compression which the tumour may exert on a ureter, a blood-vessel or the intestine. A similar fibroma growing towards the mucosa will cause menorrhagia or metrorrhagia, terminating sometimes fatally in external or internal hæmorrhage. The latter may accumulate in the pouch of Douglas, the broad ligament or in the tumour itself.

Professor Tedenat describes one case where the patient died from hæmorrhage occurring at a menstrual period after the seeming cause of the metrorrhagia had been removed. It had been thought that the excision of a pedunculated tumour was all that was required, but subsequent examination of the uterine wall showed thin-walled venous sinus formations in the mucosa. Rupture of one of these had caused death.

The author describes other cases where in spite of sub-total hysterectomy and thus avoidance of risk of hæmorrhage, the patients suffered from profound anæmia for many years. He concludes that in all cases where there are fibromata associated with cystic swellings, probably due to internal accumulation of blood, and in all cases where large myomata cause menorrhagia, laparotomy and sub-total hysterectomy are indicated. The employment of radio- or X-ray-therapy is inadvisable.

A comparative study of nodular salpingitis and of nodular malformation of the uterine horns. Babés and Coulluri refer to the various hypotheses regarding the nature of nodular salpingitis, which has been considered due (1) to inflammatory lesions originating from any general infection; (2) to the growth of neoplasms developing from embryonic tissue of the Wolffian bodies or from the Müllerian canals; (3) to tubercular infection.

The authors describe a case where after hysterectomy their examination of the uterus and adnexa led them to conclude that the nodular malformation of each tube was due neither to inflammation, tubercular lesion, nor neoplastic growth. At each uterine horn they found a nodule, fibrous in aspect, concentric in structure with a central lumen. The nodules were symmetrically cone-shaped, the base being attached to the uterus, and one side continuous with the Fallopian tube. Histologically the tissues of the nodule resembled those of the uterus at the base, and those of the tubes at the side.

The authors consider that this was undoubtedly a case of congenital nodular malformation of the uterine horn, or rather a combination of two malformations: (*a*) incomplete fusion of the two canals of Müller and (*b*) development and persistence of the canal of Wolff, and they consider that a nodular salpingitis may be differentiated from a congenital nodular malformation by the following characteristics:—

(1) Nodular salpingitis may occupy any part of the tube, but is usually found in the isthmic portion. In congenital malformation the nodules have a fixed localization; viz., the origin of the tube in continuity with the uterus.

(2) Nodular salpingitis is often unilateral, but if bilateral the nodules are not symmetrical as in congenital malformation.

(3) The form of the nodules in nodular salpingitis is generally round

or irregular. It is always regular and cone-shaped in congenital malformation.

(4) Histologically both nodular forms show muscular fibres and gland elements, but in nodular salpingitis fibres and glands are disposed without any order in the mass of the tumour, and the signs of chronic inflammation, sclerotic and infiltrated tissue are present in variable measure. There is also continuity between the glands and the epithelium of the tube. In congenital malformation, the muscular elements are disposed regularly round a central canal. The gland elements lie in the muscular layers, almost exclusively in the anterior part of the nodule, and nowhere is there any continuity between the glands and the epithelium of the tube.

Based on these characteristics it is probable that among cases published as nodular salpingitis there have been some which should have been classified as due to congenital malformation. J. H. FILSHILL.

Bulletin de la Societe d'Obstétrique et de Gynécologie de Paris, etc.

No. II, 1923.

SOC. D'OBSTETRIQUE ET DE GYNECOLOGIE DE PARIS.

9, iv, 1923.

*Radium therapy and uterine fibromatosis. Prof. POVEY (Montevideo).

Some considerations on the employment of radium in the treatment of fibroids. Mme. FABRE and M. J. GAGEY.

*Cancer of the cervix of the pregnant uterus and radium therapy. M.M. CATHALA and MERAT.

Concerning systematic curettage for retained membranes (post-partum). LE LORIER.

Abortion induced for pyelonephritis. BRINDEAU and SIGURET.

Concerning therapeutic abortion for coli-bacillosis. METGER.

SOC. D'OBSTETRIQUE ET DE GYNECOLOGIE DE LYON.

5, ii, 1923.

Placenta prævia: multiple fœtal malformations: history of paternal alcoholism. VORON and GRIVET.

Intractable vomiting and hydatid mole. VORON and BAUSSILLON.

An unusual case of hydrocephalus and spina bifida. RHENTER.

*Accidental obliteration of the vagina in adults following obstetrical or gynæcological traumatism. Secondary hæmatocolpo-metra. H. A. ALBERTIN.

A case of acute hydramnios. PLAUCHIN.

Bregma presentation. EPORVIER.

Case of dystocia due to head-locking of twins. COMMANDEUR and EPARVIER.

A case of triplets. PLAUCHU and GANDON.

Tuberculosis and pregnancy: early death after labour. VORON.

Dermoid cyst of the ovary with thyroid tissue: Cæsarean section followed by ovariotomy. PLAUCHU and GAUDON.

Cervical incisions during labour. Easy and uneventful progress of a subsequent labour. RHENTER.

*Hydatidiform mole with unusual features. VORON and GRIVET.

A case of miliary tuberculosis after abortion. GAUCHERAND.

SOC. D'OBSTETRIQUE ET DE GYNECOLOGIE DE STRASBOURG.

3, ii, 1923.

Amaurosis and eclampsism. MARET.

Endocarditis and pregnancy. RIEHL.

*Concerning the differential diagnosis of ectopic gestation. KELLER.

*Rectal stenosis due to retroflexion of the non-pregnant uterus? KREIS.

3, iii, 1923.

The absorption of fat by the lymphatics of the broad ligament in cases of ovarian dermoids. SCHICKELE.

*Contribution to the study of low Cæsarean section. REEB.

*Large peritoneal (serous) cysts. KELLER.

*Acute tubercular infection of the appendages in the puerperium. SCHICKELE.

*Lobulated malignant tumour, connected by a slender vascular pedicle with the right appendage. A small cyst of the left ovary. Enlargement of lymphatic glands, ascites. KELLER.

Torsion of a fibroid pedunculated on a fibroid uterus; vaginal myomectomy twenty years earlier; ileus by kinking of coils of intestine attached to the fibroid (death). KELLER.

SOC. D'OBSTETRIQUE ET DE GYNECOLOGIE DE BORDEAUX.

27, ii, 1923.

Tearing of the rectovaginal septum in the course of labour without tearing of the perineum. PERY.

Cancer of the body of the uterus: diagnostic curettage with perforation of the uterus: total hysterectomy on the fourth day: cure. G. BARDON and MATEY-CORNAT.

13, iii, 1923.

*Three cases of central placenta prævia. MAURICE RIVIERE.

Hæmorrhagic fibroids and radiations: necessity for preliminary uterine dilatation. BEGOUIN.

No. III, 1923.

SOC. D'OBSTETRIQUE ET DE GYNECOLOGIE DE PARIS.

14, v, 1923.

Pregnancy: cancer of cervix: radium therapy: continuation of pregnancy: living infant: Cæsarean hysterectomy: early recurrence. H. HARTMANN and Mme. S. FABRE.

Supplementary note on an observation of radium therapy for uterine cancer with subsequent pregnancy. J. GAGEY.

*Results of a series of uterine fibroids treated by radium therapy. Mme. S. FABRE.

Uterine fibroid and pregnancy: myomectomy: cure. P. MOURE.

*Dystocia by rigidity of the cervix after radium treatment of cancer. METZGER and LEGUEN.

Dystocia due to cicatricial stenosis of the cervix following one intracervical application of radium. H. VIGNES and L. CORNIL.

Diaphragm at the internal os: breech presentation: non-dilatation: Cæsarean hysterectomy: cure. LEVANT and PORTES.

*Towards the rational organization of a centre for obstetrical radiology in Paris. BOUCHACOURT.

Radium-therapy and uterine fibromatosis. Expresses the radium-enthusiast views; in the discussion Siredy, Dupont, Guéniot and Hartmann take part and Dartigues gives a fair criticism.

Cancer of the cervix of the pregnant uterus and radium-therapy. They add a case to the eight which they have found recorded. A iv-gravida, aged 35, seven months pregnant. Three days after the application of radium spontaneous rupture of membranes necessitated Cæsarean hysterectomy. Maternal death three days later; the infant survived.

In the discussion Siredey and Couvelaire recorded an early carcinoma of cervix of a uterus 8-10 weeks pregnant in a woman of 24: diagnosis of malignancy confirmed by histological examination: apparent cure followed by abortion about six weeks after radium application. Two years after she became pregnant, and was delivered by Cæsarean section about term, owing to the cicatricial stenosis of the otherwise normal cervix.

Accidental obliteration of the vagina in adults following obstetrical or gynæcological traumatism. Secondary hæmatocolpo-metra. Two cases:—(i) Three years after a curettage and application of a pessary (type not stated) which was worn for some months; incision, drainage, and packing. (i) Two years after labour with twins; incision and drainage insufficient, removal of uterus and appendages.

Hydatidiform mole with unusual features. The authors seem to have been upset at finding a hydatid mole with very little bleeding and of smaller size than a corresponding normal pregnancy.

Concerning the differential diagnosis of ectopic gestation. Keller relates two cases: (i) Giving all the classical symptoms and signs except amenorrhœa and found to be due to torsion of a small parovarian cyst; and (ii) with all classic signs and symptoms but due to torsion of a hydrosalpinx with early uterine pregnancy.

Rectal stenosis due to retroflexion of the non-pregnant uterus? Considers that the uterus is only very rarely to blame, in which view, those taking part in the discussion mostly agreed.

Contribution to the study of low Cæsarean section. Reports 10 cases; one maternal death from pulmonary embolus, one infant died before operation which was required for a large cervical fibroid; two broncho-pneumonias, two temperatures due to exudations in pouch of Douglas after cervical fibroid and impacted dermoid: incisions all healed by first intention.

Large peritoneal (serous) cysts. A suggestion of a non-infective origin in certain cases. (In the two described, it is difficult to exclude pelvic infection as the probable cause.)

Acute tubercular infection of the appendages in the puerperium. Appendage swellings to about the size of goose-eggs developed in two weeks while under observation: a known primary focus (actively extending) in lung. Bacteriology of appendages not confirmed as no operation performed; there was no clinical evidence of pyogenic infection in the puerperium.

Lobulated malignant tumour, connected by a slender vascular pedicle with the right appendage. A small cyst of the left ovary. Enlargement of lymphatic glands, ascites. The writer describes the tumour as a sarcoma and considers that it is not ovarian in origin but is a uterine fibroid which has developed attachments to the right appendage, separated completely from the uterus leaving no trace of its primary site, and finally become sarcomatous. None of the enlarged glands was examined; the ascites was recurring a fortnight after the operation.

Three cases of central placenta prævia. The author accepts as central a placenta which covers and extends beyond the internal os. The cases are all in primigravidæ and were treated (i) by version after rupture of membranes, living child 2,400 gms.; (ii) by bag through placenta and then forceps extraction, stillbirth, 3,000 gms., and (iii) by Cæsarean section, living child, 3,500 gms.

He does not consider Cæsarean section as the regular treatment for central placenta prævia but only to be used when great difficulties in the natural birth may be anticipated.

Results of a series of uterine fibroids treated by radium-therapy. A lengthy article on 78 cases including in tabular form diagnosis, treatment, immediate and remote results.

Dystocia by rigidity of the cervix after radium treatment of cancer An apparent cure of the cancer with cicatricial rigidity of the cervix : in less than a year recurrence was noted.

Towards the rational organization of a centre for obstetrical radiology in Paris. A very interesting and lengthy article which owing to its technical nature does not lend itself to summarizing. R. A. HENDRY.

Annali di Ostetricia e Ginecologia.

May, 1923.

Relation between the contents of peptone anti-bodies and the clinical reaction to peptone. (Continuation and Conclusion.) VASSALI.

*Late hæmorrhage in a case of sub-total hysterectomy. C. VOLPE.

Late hæmorrhage in a case of sub-total hysterectomy. Volpe cites cases where early hæmorrhage, after gynæcologic operations, was due to insufficient compression of some vaginal or ligamentary vessel, and describes late hæmorrhages occurring after total hysterectomy, where the symptoms resemble those of ectopic rupture and in which the result may be fatal.

Cases of sub-peritoneal hæmorrhage occurring after sub-total hysterectomy often become encysted and absorbed, but there are cases on record where hæmorrhage is severe and diffuses towards the bladder, rectum, or iliac fossa with serious or fatal consequences.

Volpe describes such a case occurring after a sub-total hysterectomy for chronic endometritis and double adnexitis.

The post-operative course was afebrile and normal till the 13th day, the patient having been allowed up on the 10th day. She seemed in good health and expected to leave the hospital in a few hours, but vaginal hæmorrhage occurred, and in spite of tamponing, ergotine injections and so on, the general symptoms became serious, indicating internal hæmorrhage.

A second laparotomy was performed, and a sub-peritoneal hæmatoma was found in the right iliac fossa, about the size of an orange, while the rest of the pelvic peritoneum was stretched to its utmost limit. Further examination showed a small hole in the peritoneum, through which blood was flowing from the uterine artery on the left side of the uterine stump.

After new suturing of the stump and artery the abdomen was closed. Recovery was tedious, and was interrupted by another slight hæmorrhage a fortnight after the first.

The technique of the original operation was perfect, so the question arose, whether the cause of hæmorrhage was due to the state of the uterine vessels or to the constitution of the patient?

Histological examination showed no evidence of degenerative changes in the vessels. There was no history of hæmophilia, and on testing the patient by the methods of Labbé and of Ducke, coagulation time was normal.

Volpe is inclined to ascribe the cause to the poorly vascular nature of the stump, due to the patient's age, and to the chronic metritis from which she suffered. This would cause necrosis of tissue, while it is probable that the action at a distance of hormones still circulating in the blood led to pelvic congestion with trophic disturbance of the blood-vessels of the stump, since the hæmorrhage coincided with the time at which menstruation was due. J. H. Filshill.

Zeitschrift für Geburtshülfe und Gynäkologie.

*The high longitudinal position of the fœtal head. Egon Weinzierl.

*Experimental investigations on the value of organotherapy. Bernhard Zondek.

*Decidual reaction in the tubes in the first three months of a one- or two-sided tubal pregnancy. Martha Tranku-Rainer.

*The origin of the vaginal bacteria. Rudolph Salomon.

*Radio-therapy in carcinoma of the cervix. Walther Schmith.

Acidosis and pregnancy: 1. The uncomplicated pregnancy. G. Bokelmann and J. Rother.

The high longitudinal position of the fœtal head. This rare anomaly, which in the writer's opinion is the rarest position of the child's head, occurred 18 times in the writer's practice in 10 years, the percentage of cases to total births being 0.2 per cent. In his experience the occipito-sacral cases are commonest in primiparæ, occipito-pubic cases in multiparæ. The ætiology of the condition is doubtful, and is thought to be due to a co-operation of factors, none of which alone are sufficient to cause the malposition. The factors mentioned are the lie of the back, shape of the head, nature of pelvis, strength of pains, time of rupture of membranes, etc. The predominant theory that it was connected with the position of the child's back at the moment of rupture of the membranes could not be proved in all cases and nothing extraordinary was noted regarding the shape of the child's head. In 10 cases the pelvis was flat, in three justo-minor, and in five normal, the malposition occurring twice in a woman with a rickety flat pelvis. In one case the arms were prolapsed alongside the head which may have been the causal factor, and in four cases the cord was twisted several times around the neck. In nine occipito-pubic cases none were delivered

spontaneously, whereas in a similar number of occipito-sacrals two were delivered without artificial aid showing the latter position not to be so unfavourable as was generally supposed. All cases were allowed to continue so as to allow a spontaneous delivery if possible, as has been advised, and in the spontaneous cases labour lasted 82 and 48 hours respectively. With this treatment, however, the writer now disagrees, and states that artificial delivery is best, for in all cases the labour was extremely protracted and interference was only done when urgent symptoms appeared, and yet it was necessary in all but two cases. The pains were usually very strong and repeated narcotics were necessary.

As regards treatment many methods by others were tried, such as endeavouring to change the position of the child and head by external manipulations, which never succeeded. Turning the head per vaginam with simultaneous turning of the back externally was also unsuccessful, due probably to labour having been allowed to go on too long and the head becoming fixed, as this method had many successes attributed to it by others. Version was done in four cases, in which asphyxia was threatening, the result being favourable in two cases. Cæsarean section was performed in two cases; in one of which, a premature child, did not survive. Forceps were used in nine cases, in seven of which the Kjelland forceps being the instrument used with excellent results, turning being easily accomplished by their use and only moderate traction being required in the majority of cases even though the head was movable above the brim to begin with. The Walcher position was used in all forceps cases and proved to be most valuable. All the children delivered by these forceps who lived, five in number, were born asphyxiated, but soon recovered and no detrimental effect to the mothers was to be noted. The two fœtal deaths were due to a misestimation of the relationship of head to pelvis, craniotomy having to be performed in one and pubiotomy in the other. The writer concludes that the high forceps, which had been previously decried as a dangerous and hard operation especially in cases of occipito-sacral positions, is really much easier than was supposed and much less dangerous, the Kjelland forceps being the best instrument for the purpose. There was no maternal mortality in the series of cases.

Experimental investigations on the value of organotherapy. Various extracts from ductless glands were used by the writer on different organs of the body to show the variable results produced and their varied effects on different organs.

Heart. It was found that corpus luteum extract relaxes the cardiac muscle in diastole, this result being due to direct action on the muscle and not on the nerve endings. Ovarian extract without corpus luteum has a similar action, but it is not so potent, the thymus extract resembling ovarian. Pituitary extract, however, has the strongest action. In no case was any damage to the cardiac muscle noted. Ovoglandol stimulated the heart primarily, the contractions only gradually decreasing, this primary action being in all probability due to its calcium content, showing that biological reaction is not specific, but is settled by different chemical composition of the same endocrine glands.

Uterus. Contraction of the uterine muscle was produced by nearly all glandular extracts, being demonstrated by the contractions caused by corpus luteum extract and ovoglandol. The pineal gland is an exception, as in

some cases it has even caused uterine relaxation, but its action is uncertain. It was shown that liver and placental extracts produce tonic contractions, their action being markedly exaggerated by putrefaction, in fact unless putrefied, liver tissue has practically no action, thus it is shown that the stimulating substances normally present in organs in small quantities can be increased by putrefaction. He also shows that abstraction of albumen from an extract may give a paradoxical biochemical reaction, *e.g.*, hypophysis optone causes relaxation, pituitrin causes contraction, the latter being chemically albumen free.

Small intestine. Hypophysis optone causes relaxation of the smooth musculature, whereas the albumen free pituitrin again paradoxically causes contraction. Similarly corpus luteum extract causes relaxation and luteo glandol contraction, which shows that the albumen content is the controlling factor in the action obtained.

On the neuro-muscular apparatus of the vessels. Corpus luteum extract produces a fairly rapid vaso-dilatation, whereas luteoglandol has no effect, showing again different biological reactions.

Blood. The red blood corpuscles are not affected, but there is a slight leucocytosis caused by corpus luteum optone and thymus. The writer states that the numerous facts in literature given regarding the connexion of the endocrine with the hæmopoietic system should be treated sceptically, as he has not proved them to be accurate, at any rate in the case of dogs.

Coagulation of the blood. Endocrine substances, however, recovered, and whether containing albumen or not have no influence on blood coagulation.

Metabolism. Chemically unchanged dried thyroid gland shows a specific increase in metabolism in cases of myxœdema, the tryptically prepared gland having no effect. Also ovarian transplantation increases metabolism 15 per cent. after castration, but this result cannot be attained by organotherapy. Thus endocrine substitution therapy is only possible by the use of chemically unchanged dried preparations or by organ implantation. The organ extract loses its specific endocrine substance in preparation and especially by the removal of albumen. The pituitary is an exception, and it is this fact that has put investigators on the wrong track, as they took its action to be a specific for all. Certain results will only be obtained by extirpation and transplantation of the glands themselves and not by injections of artificially prepared extracts.

Decidual reaction in the tubes in the first three months of a one- or two-sided tubal pregnancy. From three cases of tubal pregnancy of 5-12 weeks' duration both tubes were examined with a view to investigating the decidual reaction. All pregnancies were found to be situated in the ampullary portions of the tube. In the two non-gravid tubes, which contained a hæmatosalpinx, one showed decidual reaction, which was most marked 2 cm. from the uterine end of the tube. In the pregnant tubes decidual reaction was found $1\frac{1}{2}$—$2\frac{1}{2}$ cm. from the uterine end, and in one case only was it found in the region of the ovum. In no case was there a continuance of the reaction into the uterus, but in one case it was found in the musculature opposite the ovum and in others it could be found in the peritoneal edge of the infundibular portion of the tube.

Inflammation was present in all cases, but there seemed to be no connexion between the degree of decidual reaction present and the amount

of inflammation, although in one case it was the non-pregnant tube, which was greatly inflamed and showed a greater decidual reaction than the pregnant tube. In all cases corpora lutea were well formed with the exception of one, in which a luteal cyst was present.

These investigations go to prove that decidual reaction is not confined to the uterine mucosa and may occur in many other places, *e.g.*, uterine peritoneum, between uterine muscle bundles, in portio vaginalis of cervix, vagina, etc., the cells in many instances being activated by inflammation. In fact according to the writer all connective tissue cells in one state of development under certain conditions are able to undergo decidual reaction, the stroma cells of the uterine and connective tissue cells during development being alike and showing no specific difference.

The origin of the vaginal bacteria. The vaginal secretion in a child is usually milky, clear and tenacious, and when examined under the microscope 15-20 hours after birth is found to consist of vaginal epithelial cells, isolated bacteria and a few leucocytes. Its reaction is usually acid, but shortly after birth it is sometimes neutral. Bacteria are not usually found till the 15th—20th hour after birth, but they may be present as early as the ninth hour. Twenty-four hours after birth 73 per cent. of vaginæ contain bacteria, and by the third day no vagina is sterile, though infants delivered by Cæsarean section have been found to have no vaginal bacteria as late as the end of the second day after birth. The source of infection is varied: (1) There may be a direct migration of maternal vaginal and intestinal bacteria; (2) bacteria may be conveyed from the vulva into the vagina by the bath water, by the oil, etc., used to cleanse the new-born child; (3) migration of rectal bacteria to vulva and thence to vagina; and (4) oral bacteria may find their way to the vagina via the alimentary tract, rectum and vulva. The time taken for the bacteria of the vulva to ascend is different in individual cases and with different bacteria, many of the vulval bacteria not ascending at all. In premature children the ascent occurs early owing to inability to withstand invasion.

In 24 hours after birth 11 kinds of bacteria have been found, and there is a great preponderance of gram positive cocci especially streptococci, this state of affairs being similar to that of the mouth and rectum. The cocci predominate until the fifth day, when there is an equal number of bacilli present, after which gram positive bacilli predominate consisting of Döderlein's bacillus, Hay bacillus, etc., the proportion changing from day to day. The vaginal bacillus appears usually about 19 hours after birth and by the end of a week predominates, but it is by no means the only or nearly the only inhabitant of the vagina, as has been quoted elsewhere, the percentage being 16 per cent. of vaginal bacilli in 24 hours and 64 per cent. after 10 days. B. coli are found more commonly than was at one time thought, occurring in 25 per cent. of children.

In Cæsarean section babies cocci are conspicuous by their absence, bacilli being the first to be found and predominating always. The entrance of bacteria is influenced by the length of the second stage of labour, the time of rupture of the membranes, the number of vaginal examinations as well as by the general condition of mother and well-being of the infant.

Vaginal bacteria are by no means harmful and only cause discharge when associated with definite organisms. Thus the rational treatment of a pathological discharge consists not in the extermination of saprophytic

germs by antiseptic measures, but by the attempt to succour the inherent bacteria with the view to producing an overgrowth, which will kill off the harmful micro-organisms; this forms the trend of modern therapy for leucorrhœa.

Radiotherapy for carcinoma cervix. In the years 1913—1920 the writer has passed 255 cases of carcinoma of the cervix through his hands; of these 40 per cent. were operable and 60 per cent. inoperable. In the operable cases operation has been performed in all cases unless an objection has been made by the patient, whereas the inoperable cases have for the most part been treated with either radium or X-rays alone, or by the two combined.

When radium has been given by itself the results are as follows:—

Watched for 3½ years at least.

Group 1 (operable cases). Two cases, one still alive, the other only had one treatment and did not report again and died two years after.

Group 2 (borderline cases). Fifteen cases, of which two are living, 10 having died within two years.

Group 3 (inoperable cases). Thirty-two cases, of which two are living, 23 having died within two years.

With regard to cases treated in 1919-20, which have been watched for at least 1½ years.

Group 2. Three cases, who are all still living with no evidence of recurrence.

Group 3. Seven cases, of which one is living.

Thus taking all the cases treated by radium 12.9 per cent. are alive. The radium is applied either by placing it within the cervix or in the crater of the growth, or if this is impossible it is firmly fixed by packing against the vaginal portion of the cervix. A total dosage of 4000—6000 mg. hours radium is given, the tube being left in for 24 hours at a time, and a second dose being given 2-3 days after the first dose and then again after a few weeks; in many cases only 1500 mg. hours was given, each case being treated on its merits.

With the administration of X-rays alone, 14 cases belonging to Group 3 were treated and all died within a year except two, who lived four years and two years respectively.

With a combination of X-rays and radium, the radium being applied as described and the X-rays for 4-6 minutes at a time for six abdominal and four sacral exposures, this being repeated two or three times and then again repeated every month for several months.

Twenty-one cases were watched for 3½ years at least; of these three in Group 2 are all dead, and of 17 cases in Group 3 only one lives, 10 of the cases dying in the first year. Of 17 cases treated during 1919-20, five cases in Group 2 show one still living, whilst of 11 cases in Group 3 none are living, six dying in the second year. Thus radium alone seems to be just as good as the combined treatment.

Symptoms in many cases were greatly improved, if not cured entirely, and thus some women did not return to the clinique for further treatment, as the symptom which had led them there for advice had disappeared.

The writer had a five years' cure in 29.7 per cent. of his operation cases, and thus advises operation for operable cases and radiotherapy for the non-operable, for if the disease is not cured, in the majority of cases life is prolonged and made more bearable. W. F. Theodore Haultain.

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Corpus luteum pigment. H. H. ESCHER.

Internal hæmorrhages from rupture of a corpus luteum. H. ZACHERL.

*On the detoxicating properties of blood-serum with respect to placental toxin. T. HAYASHI.

Cholesterin metabolism during pregnancy and the puerperium. E. E. PRIBAM.

Concerning the cause of eclampsia. I. OBATA.

The blood sugar content in eclampsia : its connexion with the detoxicating action of serum on placental toxin. I. OBATA and T. HAYASHI.

The so-called endometritis deciduæ tuberosa. E. KEHRER.

A rare birth injury to the infravaginal portion of the cervix. H. FUTH.

The blood-platelet count in women. N. C. LOULOS.

The three grades of purity of the vaginal flora at the end of pregnancy. R. APEL.

*The significance of the sedimentation velocity of the erythrocytes in diagnosis of gynæcological affections. P. SCHUMACHER and W. VOGEL.

Erythroblastosis of the newborn and its relation with icterus neonatorum. H. R. EICHELBAUM.

On the detoxicating properties of the blood-serum with respect to placental poison. Saline extracts of human placenta, as shown by Obata, prove severely toxic when injected into mice, but can be rendered non-toxic when previously mixed with serum from healthy gravid or non-gravid women. This detoxicating action of serum is gradually lost if it is kept for one to five days at room or ice temperature. The detoxicating substance is destroyed by heating to 56° C. for half an hour; it is adsorbed by kaolin or fibrin powder. It does not possess the property of passing through animal membranes, and is found in the upper fluid part (not in the sediment) of dialysed serum. It is not identical with hæmolytic complement.

The blood sugar content in eclampsia. Obata has shown in previous communications that the power possessed by the blood serum of neutralizing placental toxin is much less in the case of eclamptic than of healthy pregnant subjects, but gradually returns to normal within five days of the last convulsion. In the present paper he described animal experiments in which various organs were destroyed or impaired, the detoxicating action of the animals' serum against placental toxin being tested before and after. No alteration of detoxicating power appeared to follow extirpation of kidneys, ovaries, spleen, thyroid or suprarenal, but after injury to the liver consequent on injections of phosphorus, the power of the serum to neutralize placental toxin was found to be notably impaired. The conclusion is drawn that the liver is concerned in the genesis of the detoxicating substance. In confirmation it was found that if healthy livers on the one hand and on the other the degenerated livers of phosphorus-poisoned animals were perfused with placental extract, the potency of the placental toxin was much less impaired in the latter case than in the former. From these experiments and from the severe hepatic disorganization found at autopsy in eclamptic patients, Obata is inclined to regard eclampsia as due to a diminished ability of the liver to neutralize toxic substances of placental origin.

Diagnostic significance of sedimentation velocity of the erythrocytes Taken in conjunction with a careful general and local clinical examination, the segmentation velocity of the red blood cells is usually of more diagnostic significance than the blood count. A negative finding is of more importance than a positive, *i.e.*, absence of increase in sedimentation velocity points strongly to the absence of inflammatory conditions or, at any rate, of active inflammation. The test is of importance in deciding whether to operate on morbid adnexal conditions which may or may not be inflammatory.

Vol. 119, II, *September* 12, 1923.

Pathology of the corpus luteum. P. MATHES.

Why does the follicle burst? E. STRASSMANN.

*Metropathia hæmorrhagica: anatomical and clinical features. H. RUNGE.

Frozen section studies of the fœtal development of the skeletal system and internal organs. E. VOGT.

*Operative treatment of inflammatory conditions of the adnexa and pelvic connective tissue. P. WERNER and R. STIGLBAUER.

The glycogen hypothesis. W. NIDEREHE.

Embolus and thrombosis of the mesenteric vessels in the puerperium. BUCURA.

Clinical researches concerning hydrops gravidarum. P. SCHUMACHER.

Pathology and clinical features of placental adhesions in placenta prævia. O. NEUMANN.

Regeneration of uterine muscle, especially in explantation. H. KALENSCHER.

Hermaphroditism in the male. J. MATSUNO.

Three cases of fœtal deformity. P. SCHUGT.

Papilloma of the portio. W. MOHNLE.

Metropathia hæmorrhagica. The writer describes the morbid anatomy in 126 cases of metropathia hæmorrhagica and correlates it with the clinical findings. Thirty-six uteri and 90 samples of curetted material were available: none of the ten ovaries (from five patients) available contained a corpus luteum. Metropathia hæmorrhagica is ascribed to an abnormal course of the ovarian cycle of follicular ripening: persistent follicular ripening with omission of corpus luteum-formation gives rise to vicious alteration of the endometrial cycle, from which the "pregravid development" remains absent. Persistent and intensive anabolic processes in the endometrium give rise to glandulo-cystic hyperplasia, morbid vascular changes and microscopical and macroscopical necroses, accompanied clinically by metrorrhagia. Macroscopically the uterus is diffusely enlarged; the endometrium is completely disorganized, absent in parts, ulcerated and shredded; and curetted material shows numerous minute cysts. The microscopic findings are described as characteristic, except in quite early and in very advanced cases: reference should be made to the original paper.

Combination of cervical carcinoma with metropathia hæmorrhagica has not been recorded: in the present material there was no instance of co-existent corporeal carcinoma. Clinically, every one of the cases in which review of the pathological material established the diagnosis of metropathia hæmorrhagica was associated with severe uterine bleeding, which indicated operative intervention. In about half the cases the characteristic bleeding had been preceded by irregular menstruation, and in the majority by a

few months' amenorrhœa. The ages were: six patients, 15 to 19; eight patients, 20 to 35; 14 patients, 35 to 40; 36 patients, 40 to 50; 41 patients, 46 to 50; eight patients, 50 to 57. The clinical diagnose included: metrorrhagia, metropathia hæmorrhagica, ? corporeal cancer, incomplete abortion, myoma. Bimanual examination showed the uterus to be enlarged to the size of the fist in 80 per cent. of cases: frequently it was somewhat spherical, and usually the os was partially dilated (Hegar No. 10). The blood contained no clots and is described as incoagulable in metropathia hæmorrhagica. Stephan's "endothelial symptom" (capillary ecchymoses in the upper arm after stasis) was absent in 80 per cent. of the cases.

Operative treatment of inflammatory conditions of the adnexa, and pelvic connective tissue. A review of the clinical material at the Vienna Frauenklinik from 1911—1920: 8,403 cases of inflammatory adnexal disease, with recently increasing incidence. Palliative and exploratory procedures excepted, five per cent. only came to operative intervention, which is resorted to reluctantly, although 10 per cent. of cases resist the most assiduous and prolonged conservative treatment. Total mortality was 1.6 per cent. Only 70 per cent. of those operated on were discharged completely cured after uneventful convalescence; and thus in 30 per cent. one of the chief purposes of operative treatment—to cut short the patient's disability—was not achieved. Re-examination some months after discharge showed incomplete cure in over 20 per cent. Mortality of abdominal radical operations was 7.2 per cent., of radical vaginal operations, nil: but naturally the abdominal operations comprised the more severe cases of adnexal infection. Late results of radical operation were better in those operated on abdominally.

Conservative abdominal operations were done half as frequently as radical: conservative and radical vaginal operations were about equally frequent. W. E. CROWTHER.

Muenchener Medizinische Wochenschrift.

Vol. 70, No. 15, *April* 13, 1923.

*Post-operative adhesions after gynæcological laparotomies. HAUG and HENDORFER.

Vol. 70, No. 17, *April* 27, 1923.

Indications for artificial abortion. SELLHEIM, H.

Vol. 70, No. 18, *May* 4, 1923.

On sinus puncture in sucklings. SALOMON.

Arrest of post-partum hæmorrhage by a self-retaining aortic clamp. BECKER.

*A case of sublimate poisoning from the vagina. THORET.

Vol. 70, No. 19, *May* 11, 1923.

*Intra-peritoneal bleeding from the ovary. HORNUNG.

Further researches on Abderhalden's reaction. GERSBACH.

Nasal diphtheria in sucklings. SCHUGT.

New views on the milk pump question. KULIGA.

Vol. 70, No. 20, *May* 18, 1923.

The value of serological tests for syphilis in pregnancy and the puerperium. GEORGI and HANDORN.

Vol. 70, No. 21, *May* 25, 1923.

*The correlation between the thyroid and the female genitalia. KNAUS.
*Torsion of the pedicle of ovarian tumours in children. MITTELSHAEDT.
*How should cancer of the uterus be treated? v. FRANQUE.

Post-operative adhesions after gynæcological laparotomies. At a second operation after gynæcological laparotomies the authors found only 5.9 per cent. of cases free from adhesions, but adhesions between the abdominal wall and the abdominal contents were present in only 51 per cent. When one or more pregnancies supervene between the two laparotomies 24 per cent. were free from adhesions, apparently due to the increased circulation through the pelvis in pregnancy. After vaginal cœliotomy 33 per cent. were free from adhesions, but the authors had only a small number (10) of cases of this class.

The cause of the adhesions is often to be found in the diseases necessitating laparotomy as adhesions were present in 55.3 per cent. at the first operation. The causes of adhesion were found to be infection, mechanical and chemical irritation of the peritoneum, incomplete peritonization of ligature stumps and wounds of the serosa, and lack of care in dealing with the vessels. The authors did not find that the use of iodine as a disinfectant caused the formation of adhesions.

Prophylaxis consists in the careful performance of laparotomy, with strict asepsis, arrest of hæmorrhage and covering with peritoneum all stumps and defects of the serosa.

The diagnosis of abdominal adhesions is facilitated by the establishment of pneumo-peritoneum. The treatment consists of conservative measures, operation being strongly contra-indicated.

A case of sublimate poisoning from the vagina. Thoret records a case in which a girl aged 25 who died of sublimate poisoning on the sixth day after introducing into the vagina a 0.5gr. sublimate pastille as an anticonceptional measure.

Intraperitoneal bleeding from the ovary. Hornung records two cases of pelvic hæmatocele which was caused by the rupture of a follicular hæmatoma of the ovary in the absence of extra-uterine gestation. Both cases were operated on by laparotomy and both recovered.

The correlation between the thyroid and the female genitalia. Knaus found that strumectomy was almost always followed by abnormal uterine bleeding which he attributes to the reduction in the amount of the parenchyma of the thyroid resulting from the operation. He suggests that changes in the ovaries resulting from hypothyroidism should be investigated to ascertain if the uterine bleeding might be due to alterations produced in the ovaries.

Torsion of the pedicle of ovarian tumours in children. Mittelstaedt records the case of a girl aged eight who was suddenly seized with abdominal pain. No tumour could be felt and no definite diagnosis could be made. At operation a left ovarian tumour was found in the pelvis with commencing gangrene from torsion of the pedicle. Rapid recovery ensued.

How should cancer of the uterus be treated? v. Franqué asserts that the best results are obtained by the combined use of radiation, both by X-rays and radium, together with operation. F. E. T.

Acta Gynecologica Scandinavica.

Vol. ii, Fasc. 1, 1923.

*Further researches on the reducing power of the blood during parturition and the puerperium. JOHN OLOW.

*On the use of Tarnier's dilator in infections during birth. EKKERT PETERSEN.

*On the arterial pressure in extra-uterine pregnancy. EMIL JERLOV.

*Carcinoma of a parovarian cyst with carcinoma corporis uteri. PAUL HAGGSTROM.

*On the need of vitamines by the fœtus. JOHN OLOW.

Transactions of the Gynæcological and Obstetrical Society of Copenhagen, 1920-21-22.

Vol. ii, Fasc. 2, 1923.

*A case of imaginary extra-uterine pregnancy. M. NIELSEN.

*On provocative treatment, with special reference to the value of Aolan, in gonorrhœa. NILS GYLLENSVARD.

Some remarks in reply to Professor Forssner's article on eclampsia. O. A. BOIJE.

*Congenital defects of the cranium caused by amniotic adhesions. KNUD O. MOLLER.

*On the early diagnosis of pregnancy by an artificially produced glycosuria. SANTERI LESKINEN.

*On the treatment of adnexal inflammations with turpentine injections. BRUNO NYSTROM.

A contribution to the etiology of ovarian hæmorrhage: a case of tuberculous salpingo-öophoritis with ovarian blood-cyst. BRUNO NYSTROM.

Transactions of the Obstetrical and Gynæcological section in Stockholm.

SUPPLEMENT.

*On the behaviour of the leucocytes during parturition and the puerperium in normal and febrile cases. EMIL JERLOV.

Further researches on the reducing power of the blood during parturition and the puerperium. The author has shown in a previous communication (*Acta Gynecologica Scandinavica*, vol. i, fasc. 2, pp. 169—190) that the reducing power of the blood is often increased during parturition and in the puerperium. The question arises whether this increase is due to glucose furnished by the liver and destined to form lactose, or whether it is due to lactose absorbed from the mammary glands.

The method of investigation depends on the fact that when, by boiling with acid, lactose is converted into glucose and galactose, the reducing power of the solution is increased. The reducing power of the blood is therefore determined by Bang's method before and after hydrolysis. An increase is taken to indicate the presence of lactose.

The results show that in a considerable number of cases (15 out of 31) of puerperal women, there is evidence of the presence of lactose in the blood. The same is occasionally found in parturient women.

On the use of Tarnier's dilator in infections during birth. The cases dealt with are those in which infection developes before delivery is completed. The patients specially exposed to the risk of infection are those in whom the membranes have ruptured early and the pains are weak and ineffective: this risk is present even if no vaginal examination has been made.

It is usually found that the os uteri has a diameter of 2, 3 or 4 cms. only. Various methods of hastening delivery are discussed. Large cervical incisions and vaginal Cæsarean section are condemned because they open up the lymphatics and blood-vessels and so favour the spread of infection. Bossi's dilator causes tearing and bruising of the tissues, which is equally harmful. Champetier de Ribe's bag is gentle in action, but has the disadvantage of preventing the escape of discharges.

Tarnier's dilator is free from these objections, and has been selected as the best method of treatment of this particular class of cases. The instrument has three metal blades and the force is applied by indiarubber rings which encircle the handles. It is left in position for about six hours. Delivery can then be effected without much difficulty, although the table shows that a cervical incision was still necessary in 17 cases out of 31.

The instrument should be used very cautiously in cases of contracted pelvis, and its use is absolutely contra-indicated by the presence of a Bandl's ring.

On the arterial pressure in extrauterine pregnancy. The following results were obtained by the investigation of 23 cases.

A. Diffuse intra-peritoneal bleeding (12 cases). During the first 12 hours after rupture there was a rapid fall in blood-pressure. In some cases the systolic pressure was as low as 35 mm. Hg. In two exceptional cases, the pressure was not reduced, in spite of the extravasation of one litre of blood. After operation the pressure rose to normal usually within 12 hours: in one very bad case it became normal on the second day. The amplitude (difference between systolic and diastolic pressures) was reduced during hæmorrhage and increased later. The percentage of hæmoglobin and the red-cell-count were slightly diminished before operation; and became more so afterwards, reaching a minimum on the third or fourth day.

B. Encysted collections of blood (11 cases). The blood-pressure was never found reduced except after a recent attack of bleeding. The hæmoglobin was diminished, but not proportionately to the loss of blood. In some cases a small hæmatocele was associated with a very low percentage of hæmoglobin.

It is concluded that information can be obtained which is of value in diagnosis and prognosis. In the absence of external hæmorrhage and shock a low blood-pressure may be taken to indicate internal hæmorrhage.

Carcinoma of a parovarian cyst with carcinoma corporis uteri. A case of carcinoma beginning in the right superior angle of the uterine body and invading by continuity the Fallopian tube and a parovarian cyst. No record of any similar case has been found in the literature.

On the need of vitamines by the fœtus. Pregnant mice were fed on a diet free from vitamine B. It was found that the average weight at birth was slightly diminished. It was not possible to decide whether this was due to a shortening of pregnancy or to restraint of the development of the fœtus. The author hesitates to claim any practical application of these results.

A case of imaginary extrauterine pregnancy. The patient was a neurotic woman, aged 29, who stated that after two months amenorrhœa she had been examined by a midwife who had made a diagnosis of ectopic preg-

nancy; that she had then been in bed for a month with fever; and that subsequently, during a period of three years, fœtal bones had been discharged per rectum. Swellings were felt on both sides of the uterus. The diagnosis of extra-uterine pregnancy was discredited by (1) the short duration of the supposed pregnancy, (2) the excellent general health of the patient, and (3) the fact that the bones produced for inspection were those of fowls! At the operation a hydrosalpinx and a small ovarian cyst were removed.

On provocative treatment, with special reference to the value of Aolan, in gonorrhœa. In latent gonorrhœal infection a reappearance of discharge containing gonococci can be provoked by local and general measures. This helps to settle the very difficult question whether the patient is free from infection.

Local measures may be chemical irritation (protargol, etc.), mechanical (use of probes and sounds), or thermal (hot douches). Menstruation and sexual excitement may be placed in this class. *General* measures include the use of alcohol, gonococcal vaccines, and injections of non-specific proteins.

Aolan is a sterile preparation of milk proteins. It has been recommended by Müller and Nevermann as a safe and convenient means of provocation. Gyllensvärd has failed to confirm these results, and concludes that the method is practically worthless. From his work it would appear that the best plan is to take specimens from the urethra and cervix on three successive days; the use of the probe is a mechanical irritation, which often causes gonococci to be found on the second or third day, when they have been absent at first.

Congenital defects of the cranium caused by amniotic adhesions. A case is described in which there was a deficiency of the scalp over an area measuring 10 cm. by 7¼ cm. The sagittal suture was from 2½ cm. to 5 cm. wide. The superior longitudinal sinus was covered by a thin transparent membrane. Death occurred on the 17th day as the result of hæmorrhage.

Kehrer (1910) collected 32 cases of deficiencies of the scalp, but in only two of these was the cranium involved. They are explained by the occurrence of adhesions between the cephalic pole of the embryo and the inner surface of the amnion. A similar explanation will account for encephalocele and anencephaly.

This condition is of medico-legal importance, since it might be mistaken for an injury produced during birth or in an attempt to procure abortion.

On the early diagnosis of pregnancy by an artificially produced glycosuria. In pregnancy the kidneys are more easily permeable by sugar; hence a smaller dose of phloridzin causes glycosuria. Kamnitzer and Joseph have found that an injection of 0.002 gramme of phloridzin produces glycosuria in pregnant, but very rarely in non-pregnant women. A solution is prepared containing phloridzin 0.03 gr., novocain 0.015 gr., and distilled water 30.5 gr. Two c.c. of this solution is injected into the gluteal muscles. It must be done in the morning before any food has been taken. The patient drinks 200 c.c. of water at once, and again in half an hour. The urine is tested for sugar before the injection, and three tests are made at intervals of half an hour after the injection. Glycosuria is found during the first hour only.

Leskinen obtained the following results :—Of 13 women in the first three months of pregnancy, 12 gave a positive reaction, some as early as six or eight days after the non-appearance of menstruation. Of four women who had recently miscarried two were positive. Of 31 non-pregnant women positive results were obtained in five cases.

On the treatment of adnexal inflammations with turpentine injections. The preparation used was "Terpichin (Oestreicher)," which contains turpentine, quinine and anæsthesin. Intramuscular injections were given on alternate days, usually six doses in all. A transient albuminuria resulted in a few cases. Rest and tonic treatment were employed at the same time.

Sixty-three cases of pelvic inflammation were treated. Of these 25 were discharged cured, 26 improved, and 12 needed operation. The best results were obtained in acute and subacute cases, especially in para- and perimetritis.

It is concluded that, although the method does not fulfil all the expectations that have been raised, yet it should not be discarded; for it is free from danger, and in at least a proportion of cases it assists the resolution of inflammatory exudates and improves the general condition of the patient.

On the behaviour of the leucocytes during parturition and the puerperium, in normal and febrile cases. This includes an analysis of previous work on the subject and gives the results obtained in the investigation of 85 cases—21 normal and 64 febrile. Daily blood-counts were made, sometimes over a period of two months : the absolute numbers of neutrophils, lymphocytes, eosinophils and monocytes (mononuclears and transitionals) were determined.

In *normal parturition* there is a neutrophil leucocytosis, which soon decreases and disappears within three or four days. The lymphocytes are diminished just after delivery, and then they gradually increase. The eosinophils usually disappear during delivery, but after a few days slightly exceed the normal numbers. The monocytes show no very significant change.

Pathological cases are classified as follows :—(1) Febris intra partum, (2) Febris resorptionis (sapræmia), and (3) Sepsis; the criteria for inclusion in the last group being either a positive blood-culture or the presence of definite suppuration in the genital organs or elsewhere.

In all febrile cases there is in the early stages a neutrophil leucocytosis, which declines *pari passu* with the fall in temperature. The lymphocyte count is usually low : it increases with the retrogression of the infection : in fatal cases of sepsis very low values are found. The eosinophils are few or none in the early stages : the slighter the infection the earlier their return and the more numerous they are as a rule, but sometimes they are absent for a long period in cases that do well. The monocytes follow the lead of the neutrophils, but the changes are not so striking.

The following points of prognostic importance are given :—

1. In febris intra-partum, a high neutrophil count (*e.g.*, over 20,000) indicates great probability of commencing infection.
2. In "resorption-fever" or sepsis, when neutrophil leucocytosis is still found after a few days' absence of fever, watch should be kept for further complications.

3. A definite sufficiency of lymphocytes, even when other clinical symptoms are serious, is a hopeful indication; and this is even more certain when a satisfactory number of eosinophils are found.
4. An insufficiency of lymphocytes is usual at the beginning of an infection, and later a very low value may be found : the insufficiency is temporary in favourable, permanent in unfavourable cases.
5. The presence of eosinophils in sufficient numbers is a hopeful indication, but the absence of eosinophils does not necessarily imply a bad prognosis. A. GOUGH.

Boletin de la Sociedad de Obstetricia y Ginecologia de Buenos Aires.

*Primary tuberculosis of the cervix. Prof. O. L. BOTTARO and A. J. PAVLOVSKY.

Porro's operation in atresia of the cervix and sepsis of the uterus. A. J. GUIROY.

Symphysiotomy in general practice. Prof. J. B. GONZALEZ.

Primary tuberculosis of the cervix. The authors describe a case in which vegetative ulceration of the cervix, at first diagnosed as epithelioma, was found to be due to a primary tubercular lesion. Tuberculosis of the cervix is generally secondary to tubercular infection in some other organ, and is usually associated with the same lesion in the Fallopian tube or some other portion of the genital tract. In this case there was no history or evidence of tuberculosis elsewhere in the system, and in these circumstances many surgeons recommend amputation of the cervix only, or treatment by radio-therapy.

The authors considered it an eminently favourable case for radio-therapy, but are obliged to confess that the result of treatment, though locally successful, was distinctly disappointing.

Seventy days after the first treatment by radium and forty-two after the last, the actual state of the patient was as follows : *Locally* the discharge was much less and the cervix was sclerosed and diminished in volume, but *generally* the patient was much thinner and looked extremely anæmic. The disease had evidently pursued its course, affecting the body of the uterus and the adnexa. There were also indications of phthisis at the vertex of one lung.

The authors have therefore concluded that, in all similar cases, sub-total hysterectomy is the safest treatment, while tuberculin or helio-therapy, super-alimentation, etc., should be used as adjuncts to combat any tendency to general tuberculosis. J. H. FILSHILL.

The following abstracts are reprinted from "MEDICAL SCIENCE : ABSTRACTS AND REVIEWS," by kind permission of the Medical Research Council :—

Tuberculosis and pregnancy. WINTER, G., and OPPERMANN, W. *Deutsch. med. Wchuschr.*, 1923, 49, 1-3, 45-7, 76-8, 115-17. Abstracted from "Medical Science : Abstracts and Reviews, 1923, viii, 6, 451.

Winter and Oppermann, of the Konigsberg University Women's Clinic,

state that the mortality of pulmonary tuberculosis, after the onset of pregnancy, varies from 16 to 100 per cent. according to 18 different observers. Of 129 pregnant women in Winter's Clinic, 67, or two-thirds, showed an aggravation of their disease as the result of pregnancy, while in one-third the disease was not affected. The outlook varies according as the tuberculous process is latent or manifest. Of 43 cases of latent tuberculosis 33, or 77 per cent., showed no aggravation of their condition, while of 96 cases of manifest tuberculosis 86 per cent. were aggravated, and only 14 per cent. were not affected by pregnancy. With the exception of one patient who showed no change, all the cases of laryngeal tuberculosis grew worse and died.

Winter considers sterilization indicated in the following circumstances: (1) When the stage of tuberculosis reached is not likely to admit of complete recovery; (2) when the woman's means do not allow her to undergo the necessary treatment for recovery, such as residence in a sanatorium; (3) in all cases of laryngeal tuberculosis.

J. D. Rolleston and C. Lillingston.

Tuberculosis and pregnancy. Bar, Bernard L., Dumarest, P., Brette, P., Herrgott, A., and Pinard. *Bull. Acad. de Méd.*, 1922, third ser., 87, 724-6, 88, 219-41, 259,75, 309-12, 579-90, 602-4. Abstracted from "Medical Science: Abstracts and Reviews," 1923, viii, 6, 452.

The relations between pregnancy and tuberculosis recently formed the subject of an animated discussion at the Académie de Médicine in Paris between phthisiologists represented, among others, by Dumarest and Brette and Bernard and obstetricians represented by Bar, Herrgott and Pinard. Dumarest and Brette recorded seven cases of women whose pregnancies went to term without any aggravation of their pulmonary condition, and alluded to similar cases described by Lasègne and Sabourin. In most of the cases the tuberculous process appeared to be suspended, and in some it was decidedly improved by pregnancy. As a general rule, Dumarest and Brette were opposed to interruption of pregnancy in tuberculosis. They maintained that if the mother's condition was aggravated by pregnancy the aggravation would persist in spite of therapeutic abortion, and that the child would be sacrificed without any compensation. The child's interest dominated the situation, and the only operation indicated was that which would save the child if the mother's condition was desperate. Bernard referred to his previous communication (see *Medical Science*, 1922, 7, 98), and brought forward another set of statistics from his tuberculosis service at the Laumec Hospital. Of 327 women, 81, or 24 per cent., had a recent history of pregnancy. Twenty-two of these had shown the first signs of tuberculosis during pregnancy, and 33 after delivery. Fifteen had an aggravation or re-activation of old tuberculous manifestations during pregnancy, and 11 after delivery. Forty-three were primiparæ and 29 multiparæ. Of the 327 cases, 81 were definitely initiated or aggravated as the result of maternity, while, on the other hand, there were 85 cases with a history of pregnancy which did not appear to bear any relation to the present attack of tuberculosis. Bernard was not convinced that induction of abortion in tuberculosis was justifiable either scientifically or legally.

Bar stated that from November 1907, to October 1922, more than 400 tuberculous women had been admitted to the Tarnier Obstetrical Clinic, 60 of these died in hospital, and the number of deaths would have exceeded

100 if those had been included who had left hospital to die at home. When a tuberculous patient not far advanced in pregnancy gave a well-marked cuti-reaction Bar refused to interfere and trusted to medical treatment. On the other hand, when he found in patients not far advanced in pregnancy a feeble or no reaction, when the condition of the lesions would have made him expect a strong reaction, he was inclined to induce abortion, especially if the disease appeared to have commenced with pregnancy. Abortion was the simplest method of interruption, but hysterectomy was performed at the Tarnier Clinic in 16 multiparæ whose pulmonary lesions rendered a new pregnancy undesirable. Pinard was strongly opposed to interruption of pregnancy merely on account of tuberculosis in the mother, and declared that interruption of pregnancy was only indicated when the mother's life was in danger. He agreed with Rist that there was no proof that induction of abortion increased the woman's chances of survival.

Herrgott of Nancy stated that though he had seen a few cases with cavities of considerable size which did not increase as the result of pregnancy, he had seen a much larger number in which pregnancy, and especially confinement, had altered the character of the disease, which had thenceforward taken on a galloping course. It was very rarely that he advocated abortion in such cases.

J. D. Rolleston and C. Lillingston.

Congenital tuberculosis, with report of a case. Pratt, G. P. *Am. J. Dis. Child.*, 1922, 23, 88–90. Abstracted from "Medical Science: Abstracts and Reviews," 1923, viii, 6, 453.

Pratt, of the Nebraska University College of Medicine, reports the following case of congenital tuberculosis. A woman, aged 24, died of acute miliary tuberculosis in the fifth month of pregnancy. At the autopsy no gross or microscopical lesions were found in the fœtus, but tubercle bacilli were found in smears from the cut surface of the liver (*Status bacillaris* of J. Honl, 1894). J. D. Rolleston and C. Lillingston.

Transmission of syphilis to the second generation. Cooke, J. V., and Jeans, P. L. *Am. J. Syph.*, 1922, 6, 569-85. Abstracted from "Medical Science: Abstracts and Reviews," 1923, viii, 6, 486.

Cooke and Jeans have investigated the irregularities in the transmission of syphilis to the second generation, at the Department of Pediatrics at the Washington University and at the St. Louis Children's Hospital. Comparison of blood tests with clinical examination has strengthened their confidence in the value of the Wassermann reaction in hereditary syphilis. With regard to syphilitic children born of mothers with a negative Wassermann reaction, the authors do not accept direct paternal transmission without infection of the mother as an explanation of this occurrence. They consider it difficult to believe that spirochætes from the father confine their activity to the ovum without lodging in the maternal tissues, or that an ovum so inoculated would develop. The fact that protection from syphilis without infection has not been demonstrated either in man or experimentally does not support the assumption of the development of immunity in a non-syphilitic mother carrying a fœtus infected from the sperm. The true explanation, they think, is a condition of latency due to the development of tissue immunity, even when spirochætes are present. In a previous study the authors found that 85 per cent. of the mothers of syphilitic

children gave positive reactions. Of the remaining 15 per cent. the infected children, with one exception, were over 10 years of age, and in some families non-syphilitic children had since been born. In the present study several cases are cited showing that mothers of younger syphilitic children may have negative reactions. Such cases, they think, signify latency and not sperm infection.

When the mother's Wassermann reaction is strongly positive the authors find that over 70 per cent. of the infants are infected. They think, however, that in such cases a healthy child may be born, and that this may be explained by the infection in the mother being localized in foci remote from the placental site. When the mother's Wassermann is positive with cholesterinized antigen only, they find that 70 per cent. of infants are not syphilitic. As nearly 40 per cent. of fathers of syphilitic children have negative Wassermann reactions (at the time when the children are examined) they may transmit the disease during latency. Transmission to the third generation they think possible, but incapable of proof. As regards twins, single ovum twins born of a syphilitic mother are either both affected or both escape infection; double ovum twins, on the other hand, have the same fate as children of two successive pregnancies, *i.e.*, either, neither, or both may be infected. The placentas of syphilitic infants showed characteristic microscopical changes in 27 per cent. only, so that absence of these is of little diagnostic importance. As regards the Wassermann reaction in the infant at birth, this was strongly positive in 45, weakly positive in 18, and negative in 37 per cent.; but strongly positive in all syphilitic infants after the first few weeks or months. According to Cooke and Jeans non-syphilitic infants may give weakly positive reactions at birth, which become negative later, but never give strongly positive reactions. All mothers of such non-syphilitic infants have themselves reactions of equal or greater intensity than their infants. In these cases the fixing substances are probably transmitted from mother to infant but not the infection.

C. F. Marshall and C. Lillingston.

A case of primary syphiloma of Bartholin's gland. Ramazotti, V. *Ospedale Maggiore*, 1922, 9, 242-7. Abstracted from "Medical Science: Abstracts and Reviews, 1923, viii, 6, 487.

Ramazotti reports a case of primary syphiloma of Bartholin's gland. The patient, aged 26, was first treated for gonorrhœa: not long afterwards an erosion formed at the opening of Bartholin's duct, followed by enlargement of the gland. In due time secondary syphilis and a positive Wassermann reaction appeared. The gland was removed and showed *Spironema pallidum*, but no gonococci, in sections.

C. F. Marshall and C. Lillingston.

The influence of the treatment of syphilitic pregnant women upon the incidence of congenital syphilis. Williams, J. W. *Bull. J. Hopkins Hosp.*, 1922, 23, 385-6. Abstracted from "Medical Science: Abstracts and Reviews," 1923, viii, 6. 489.

Williams, at the Johns Hopkins Hospital, has studied the influence of antenatal treatment on the incidence of congenital syphilis. He refers to his previous study of the Wassermann reaction in 4,547 women (*Medical Science*, 1921, 4, 409) from which he concluded that syphilis was responsible for 34.4 per cent. of fœtal and infantile deaths between the age of viability

and the first two weeks of the puerperium, and showed that by efficient treatment of the mother during pregnancy the percentage of infants born with signs of congenital syphilis could be reduced from 48.5 to 6.7. The present study deals with the after-history of 96 of the above women and the results of 113 pregnancies during the years 1920-21.

From the 113 pregnancies there were 94 living children. Of these five, or 5.3 per cent., showed signs of syphilis, four had died, nine were lost sight of, and 76 were living and well with no signs of congenital syphilis in 1922.

Comparing the results of efficient and inefficient treatment of the mother, it was found that the results were remarkably good after treatment by six doses of arsenobenzol, followed by mercury and iodide, and repeated until the Wassermann reaction in the mother was negative. In a series of 49 women, who had children both before and after the above treatment, the percentage of living children was increased from 40.7 to 87.4 as the result of treatment. Surprisingly good results, however, were obtained in the cases insufficiently treated; 29 pregnancies in 18 women resulting in 19 healthy infants (examined four to 24 months afterwards). In some cases one or two doses of arsenobenzol was sufficient to produce a negative Wassermann reaction and a living child. It is also noteworthy that in 11 cases the reaction had become negative in the mother without any treatment, and subsequently all the children were normal after previous syphilitic ones. Such cases showed the need of caution in interpreting the results of treatment. They also show that the pregnant woman is more amenable to antisyphilitic treatment. As a rule, although some are refractory, Williams remarks that there must be something which mitigates the severity of the disease and predisposes to spontaneous cure. He mentions the observations of Keidel and Moore, which showed that neurosyphilis is much less common and more benign in women who have had children than in nulliparæ; also Brown's experiments on rabbits, showing that the pregnant female was more refractory to inoculation with syphilis. Williams concludes by pointing out the frequent difficulty of diagnosis. On the one hand, the Wassermann is not sufficient, for a persistently negative reaction does not exclude syphilis and may occur with the birth of syphilitic infants; on the other hand clinical signs and a history of syphilis are frequently absent. Diagnosis in the infant is helped by X-ray examination of the epiphyses.

C. F. MARSHALL and C. LILLINGSTON.

Inguinal hernia of the uterus. LATTERI, F. S. *Arch. ital. di Chir.*, 1923, 7, 39 Abstracted from "Medical Science: Abstracts and Reviews," 1923, viii, 6, 499.

This article describes a case of left inguinal hernia of an imperfect uterus and appendages in a woman of 36, and gives abstracts of 77 other cases, with a few additional references to the literature. The author concludes that the lesion occurs only with some congenital abnormality, not necessarily of the embryonic parts of the organ itself, but rather an anomalous evolution of the canal of Nuck and deranged development of the genito-inguinal ligament, the two elements of which tend, in these cases, to fuse as they do normally in the male. The cases may be classified into partial and total herniæ; those of the gravid uterus and those of the uterus of the pseudo-hermaphrodite. The hernia is generally irreducible and more frequent on the left than the right side. Diagnostic points are: pain and

increase in volume at the menstrual periods; lengthening and narrowing of the vagina, with marked inclination to the side of the hernia; communication of the contents of the sac of movements impacted to the vaginal walls, or, in "incomplete" cases, to the cervix. Where the herniated uterus becomes gravid, besides the rapid increase in size, there are also the souffle, fœtal movements, and heart sounds. Operation should be undertaken as soon as the diagnosis is made to obviate the possibility of pregnancy; but should it have occurred, then intervention must be at the earliest possible moment and should aim at "reduction" of the contents rather than at hysterectomy. The results of cases dealt with late in pregnancy, judging by the few accounts available, are unsatisfactory. Cæsarean section in these circumstances has a mortality of 80 per cent.

E. Rock Carling.

A bacteriologic study of vulvo-vaginitis of children. Anderson, R. A., Schultz, O. T., and Stein, I. F. *Journ. Inf. Dis.*, 1923, 23, 6, 444. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, 1, 17.

In a series of 42 cases of vulvo-vaginitis among children (up to 15 years) Anderson, Schultz and Stein found that 35.7 per cent. were gonorrhœic and 64.3 per cent. were non-specific. In 53.3 per cent. of the gonorrhœic cases the gonococcus was isolated in pure culture, the diagnosis in the remainder of the cases being based on morphology and staining reactions. They consider that preference should be given to the direct smear method in diagnosis. In no case was it possible in their experience to cultivate gonococci from material in which gonococci could not be seen in stained films. In the non-gonorrhœic cases a mixed flora was present, but streptococci of intestinal origin appeared to be the most important agents. Staphylococci *B. coli* and several Gram-positive bacilli were frequent, and were interpreted as secondary invaders or harmless symbionts. Uncleanliness and local irritation were believed to be an important and probably the primary factor in the non-specific cases, the condition thus established being maintained or made worse by bacterial invasion. Quarantine and exclusion from school were not believed to be necessary in the non-gonorrhœic cases.

W. Bulloch.

The excretion of "acetone" in nausea and vomiting of pregnancy. Harding, V. J., and Potter, C. T. *Brit. Journ. Exper. Med.*, 1923, 4, 3, 105. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, 1, 20.

The excretion of "acetone" in the majority of cases of nausea and vomiting of pregnancy parallels the clinical condition.

The effect of abortion is to diminish the production of "acetone."

Tissue destruction in nausea and vomiting of pregnancy when under the influence of small amounts of carbohydrate is governed by the demand for further supplies of carbohydrate.

The results are similar to those observed in some cases of starvation, but in pregnancy the demand for carbohydrate, and consequently the disturbance following its lack, is more intense than in starvation.

Authors.

Erysipelas in the infant. Schliepe, A. *Arch. f. Kinderheilk*, 1923, 73, 32-9. Abstracted from "Medical Science: Abstracts and Reviews, 1923, ix, 1, 24.

Erysipelas is a rare disease in infancy. During the period 1912-21 only

17 cases, or 0.34 per cent., occurred in infants, including three just over 12 months of age, at the Greifswald University Medical Clinic, out of a total of 5,000 cases at all ages. According to Rosenbaum, the incidence of erysipelas in infancy is 0.7 per cent., while Schuster's estimate is 1.99 per cent. Erysipelas in the adult is most frequent in the spring, as is shown by the statistics of Frickhinger, who found that 29.74 per cent. of all his cases occurred in the spring, 25.42 in the winter, 22.57 in the summer, and 22.7 in the autumn. On the other hand the majority of Schliepe's cases, viz., 9, or 53.7 per cent., occurred in the summer, 3 in the winter, 3 in the spring, and 2 in the autumn. The highest incidence of infantile erysipelas in the summer is probably due to the diminution of natural resistance to infection owing to the greater frequency of gastro-intestinal disturbance at this period. The observation made by writers on erysipelas in the adult, that the disease is most frequent in the female sex, was not confirmed in the present series, as ten of the cases were in males and seven in females. The disease was most frequent during the first three months of life, during which twelve cases occurred; there were none in the second quarter, only two in the second half of the first year, and three in the second year, so that with advance in age infantile erysipelas diminishes in frequency. More than half the cases (10 patients, or 58.8 per cent.) were examples of erysipelas of the face; the lower extremities were affected in five, the trunk in one, and the anal region in one. The starting-point of the disease in most cases was a pre-existing affection of the skin or subcutaneous tissue, viz., furunculosis in seven cases, subcutaneous abscesses in three, and pemphigus in one; in one case erysipelas was attributed to otitis media, in one to puerperal fever in the mother, and in four the cause was unknown. The clinical picture of erysipelas in the infant was much the same as in the adult. No exact information was available as regards the incubation period and prodromal stage, but in three cases the incubation period was apparently four, five, and ten days respectively, which corresponds to the figures given by Roger, Billrotin, Schmitt, and Rosenbaum, so that the length of the incubation period is probably the same in the adult and in the infant. The principal symptoms in the infant, as in the adult, were fever and the cutaneous manifestations. No special type of fever was observed, the temperature being in some cases continued, and in others remittent, intermittent or irregular. Defervescence took place by crisis or lysis when death did not occur at the height of the fever. The highest temperature observed was 107.8° F., which was registered in an infant of three weeks and fell by crisis to 94.2° before death. The duration of the fever varied in different cases from 3 to 33 days. Afebrile cases were not observed. The inflammation of the skin was often very slight for the first two days, and did not show the definite edge seen in the adult. Termination by gangrene was more frequent than in the adult, especially in places where the skin was firmly adherent to the underlying tissue, *e.g.*, over the malleoli. In all but six cases more or less severe complications ensued, viz., adenitis in eight cases, albuminuria in six, furunculosis in five, digestive disturbances in four, bronchitis in three, and pneumonia in three. In three cases erysipelas ended in abscess formation, in five in septicæmia, and in six it assumed the wandering form. Twelve of the cases were fatal—a mortality of 70.6 per cent. Eight of these were examples of facial erysipelas, two of erysipelas of the lower limbs, and one each of erysipelas of the trunk and anal region. As regards treatment local applications were

of less importance than the feeding. In young children the mother's milk was essential. Only three cases were treated with serum: one with diphtheria antitoxin and two with antistreptococcic serum, so that Schliepe did not form any conclusions as to this mode of treatment.

J. D. ROLLESTON.

The glocosuria of pregnancy and so-called renal diabetes. MOTZFELDT, K. *Norsk. Mag. f. Lægevidensk*, 1922, 83, 689—703. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, i, 37.

Motzfeldt admits that it is difficult to distinguish between the glycosuria of pregnancy and the early stages of true diabetes. If the sugar in the urine is lactose it is of no importance; if it is glucose the differential diagnosis ought to be made, as the institution of dietetic treatment will depend upon it. To illustrate the problem he records the case of a woman, aged 26, who showed glycosuria without any other sign of diabetes during two successive pregnancies. The sugar content of the blood was normal (0.09 per cent.). Restriction of carbohydrates was immediately followed by ketonuria. The sugar excreted in the urine was not influenced by the intake of carbohydrates, and the glycosuria disappeared six days after confinement. A month after confinement her carbohydrate tolerance was normal. A survey of the literature of glycosuria in pregnancy shows that Cron has found it only in 4 per cent., while Brocard found it in 50 per cent. As these statistics include lactosuria they are not very instructive.

C. LILLINGSTON.

The chronic disturbance of digestion in infants. BLOCH, C. E. *Ugesk. f. Laeger.*, 1923, 85, 1-8. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, 1, 38.

At the Regshospital in Copenhagen barley-water test meals have been given to 64 infants suffering from chronic dyspepsia and infantile atrophy. The results, according to Bloch, showed that the acidity of the gastric juice was normal in 31 cases. In the remaining 33 cases there was diminution or total absence of acidity. In 15 of these cases aclylia persisted for weeks and even months in spite of dietetic restrictions. In the remaining 18 cases return of acidity towards normal corresponded with an improvement in the general condition.

Of 61 infants admitted to hospital with chronic dyspepsia and atrophia infantilis, all had been artificially fed for several months, and most had been given cow's milk since birth or from the tenth day after birth. In most cases whole cow's milk had been given in great quantities and inadequately diluted. Fifteen had suffered from debility since birth, and 21 had developed chronic dyspepsia after a severe attack of gastro-enteritis. In 20 cases the chronic dyspepsia could be connected with other acute or subacute infections or with a severe constitutional disease like syphilis. Bloch has come to the conclusion that chronic dyspepsia and atrophia infantalis are associated with a simple insufficiency of the digestive glands, and this insufficiency is the cause of the dyspepsia, of the fermentative processes in the small intestine, and of the infantile atrophy. The cause of the insufficiency, in its turn, is overloading the digestive organs, which are either congenitally weak or have become weakened by acute or chronic diseases. The treatment he advocates aims at giving the digestive system the maximum of rest and reducing fermentation. Thin barley water,

containing 2 per cent. cane-sugar, should be the only nourishment for not more than the first day or two. After this semi-starvation diet, milk dilutions and barley water should be given. Buttermilk is particularly useful because of its lactic acid. Human milk is, however, usually the best diet for these cases. The prevention of fermentative decomposition is not to be effected by antiseptics, but by occasionally giving a little petroleum, by promoting the mutual action of the digestive glands, and by giving small quantities of food which do not ferment readily.

C. LILLINGSTON.

Pathogenesis of uræmia and eclampsia: experimental convulsive uræmia and eclampsia. HERRMANNSDORFER, A. *Deutsch. Zthchr. f. Chir.*, 1923, 178, 289—392. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, 1, 53.

Having shown that the intraperitoneal injection of urine in normal rats produced true uræmia (retention-uræmia), the author tested the action of the toxic urine of cœlostomized rats in a similar way. In this case the onset and fatal results were accomplished with tonic-clonic convulsions resembling those of eclampsia.

There remained the question whether the convulsive poison thus shown to be present in the urine of cœlostomized rats owed its origin to some alterations of the general metabolism resulting from the union of the two animals; or whether the kidneys were specially implicated in its production. This was tested in two experiments: (1) all four kidneys were removed from the cœlostomized animals. The result was retention-uræmia without convulsions, showing that no convulsive poison was present. (2) The apex of the bladder was removed in the cœlostomized animals, the kidneys being left intact. The result was death with eclamptic convulsions, showing that the kidneys played some part in the production of the poison.

The author points out that in pregnancy the relation of mother and fœtus is analogous to that obtaining between the two animals in parabiosis.

T. W. P. LAWRENCE.

The action of chemical substances on gonococci in vitro and in vivo. JOTTEN, K. W., and PASCH, C. *Ztschr. f. Hyg. u. Infektionskrankh.*, 1922, 98, 161. Abstracted from "Medical Science: Abstracts and Reviews," 1923, ix, 1, 73.

The authors carried out a large number of tests of many chemical preparations on the gonococcus. The substances included many different silver compounds, gold, copper, iron, also alka-lysol, parmentol, yatren, salvarsan, dye-stuffs. The experiments were made *in vitro* and in mice which after intraperitoneal infection succumb in 24 hours with typical toxic symptoms. Silver and mercury, salts were found to be the most effective *in vitro*, but silver salts were ineffective *in vivo;* of dyestuffs the best were flavin and its compound with silver, "argoflavin." W. BULLOCH.

REPORTS OF SOCIETIES.

THE ROYAL SOCIETY OF MEDICINE.

Section of Obstetrics and Gynæcology.

Meeting of the Section held October 4, Dr. Cuthbert Lockyer, President, in the chair.

Dr. Everard Williams showed a specimen of "adenomyoma occurring in a bi-cornuate uterus." The subject, from whom the specimen was obtained, was a single woman, aged 31, who had absolute amenorrhœa, and severe abdominal pains each month. In each side of the pelvis, situated at the junction of the Fallopian tube with the uterine horn, was a small solid tumour which, on section, showed the usual appearance of adenomyoma.

The specimen was discussed by the President.

Mr. W. Gilliatt described a rare condition in which a patient had had a "Placenta prævia in four successive pregnancies." The chief points were that this patient had been pregnant only four times, that the children had all been males, two of whom are now alive and well, and two stillborn. No abnormality of the pelvic organs could be detected during pregnancy, in labour, or in the intervals between the pregnancies. There are only two other cases recorded in the literature in which placenta prævia has occurred more than once in the same patient: (1) Fitzpatrick, E. H., *Lancet*, 1889, vol. i, 678; (2) Hedback, A. E., *St. Paul Med. Journ.*, Minnesota.

Mr. Rivett gave his experience of a similar case.

Drs. H. Williamson and G. F. Abercombie read a short communication on a case of "Inversion of the uterus caused by a squamous-celled carcinoma of the fundus." The inverted uterus was treated by the application of thirteen needles containing radium bromide so as to irradiate the whole of the malignant tissue equally. The uterus was removed by abdominal panhysterectomy and the patient did well. From a review of the literature it appears that inversion of the uterus by a carcinoma of the body is of extreme rarity.

The President, Mr. Gilliatt, Lady Barratt, Dr. Fairbairn, and Sir George Blacker discussed the specimen.

Mr. Gordon Luker read a paper on the

Treatment of puerperal sepsis by a new method,

which appears on page 592 in this number of the Journal.

The paper was discussed by the President, Mr. Eardley Holland, and Dr. Barris.

Meeting of the Section held November 1, Dr. Cuthbert Lockyer, President, in the chair.

Mr. A. C. Palmer showed two specimens:—

(1) The specimen consisted of 3 ft. 3 ins. of gangrenous small intestine and a portion of thrombosed mesentery. The gut had passed through a

perforation in the fundus of the uterus and was found prolapsed as a loop from the vulva. The gut was resected at the point where it passed into the uterus, and an end-to-end anastomoses performed. The patient did well.

The specimen was discussed by the PRESIDENT, Dr. RUSSELL ANDREWS, and Mr. EARDLEY HOLLAND.

(2) A specimen of fœtal liver in which the greater part of the right lobe had been replaced by blood clot. The naked eye appearance of the specimen suggested a cavernous hæmangioma. Histological investigation showed that the swelling was not an angioma; that it was due to extreme venous engorgement of the right lobe of the liver. In part of the swelling the tissue was necrosed; in other parts there was round-celled infiltration and fibrosis. It appears probable that the venous infarction was associated with thrombosis of the right hepatic vein. This vein was found filled with thrombus up to its point of entry into the inferior vena cava.

Mr. A. B. DANBY read a short communication on :—

THREE CASES OF PREGNANCY WITH EXTRAVASATION OF BLOOD ASSOCIATED WITH ALBUMINURIA.

He said that two of the cases were large vulval hæmatomata. The bleeding in one instance came on 15 hours after parturition, whilst in the other it actually obstructed labour. Both patients had well-marked albuminuria, both were primiparæ, and in neither instance was there any evidence of varicose veins or trauma.

The other case was one of concealed and revealed accidental hæmorrhage. A Cæsarean hysterectomy was performed under spinal anæsthesia, with good recovery. He pointed out that there seemed to be an analogy between the hæmorrhages occurring in the uterine wall and subperitoneal tissues and the hæmatomas of the vulva. The former were now generally accepted as being toxæmic in origin. Could not a similar factor be responsible for some of the cases of vulval hæmatoma, as in the two cases recorded?

Microscopic slides were shown from sections taken from the uterus in the case of accidental hæmorrhage. They revealed the presence of fatty degeneration in the walls of many of the capillaries. The appearances suggested an adequate explanation of these hæmorrhages.

The specimen was discussed by the PRESIDENT and Lady BARRATT.

Dr. MORLAND MCCREA and Mr. VICTOR BONNEY read a paper on

THE RELATION BETWEEN CERTAIN ABNORMAL STATES OF THE FEMALE GENERATIVE ORGANS AND SYMPTOMS ORDINARILY CONSIDERED THE PROVINCE OF THE PHYSICIAN.

They pointed out that in the past gynæcologists were physicians and laid much stress on certain general symptoms which they regarded as a reflex, or sympathetic to disease of the genital tract.

Gynæcology was now a branch of surgery, and it had become the fashion to discredit these collateral affections. The older gynæcologists, however, were not wrong, for abnormalities of the genital organs did in certain instances affect the general health by causing toxic or bacterial absorption, and the symptoms so produced did not at first sight in many cases suggest a gynæcological origin.

They described a class of case in which intestinal stasis was primarily dependent on displacement of the pelvic floor and uterus. The mechanism of defæcation in women was closely considered. Three factors were concerned :—(1) The contraction of the bowel wall. (2) The intra-abdominal

pressure which acted on the rectum by the medium of Douglas's pouch which formed a pneumatic wedge compressing the rectum against the sacrum; and (3) the muscular pelvic floor which made counter-pressure against the diaphragm and abdominal muscles during the act of straining and whose posterior fibres pulled the anus over the advancing faecal mass. When any of these factors became inoperative constipation and stasis was favoured.

The condition was a chronic one and very commonly symptoms local to the pelvis if they existed, were overlaid and obscured by the symptoms due to the inert distended bowel and the subsequent toxæmia. This class of patient consulted a physician and not a gynæcologist, so that unless the former was able and willing to make an intelligent vaginal examination the primary cause of the symptoms was very apt to be overlooked. Stasis was far commoner in women than in men, a fact at once suggesting that the peculiarities of the female pelvis were on occasions causative.

They then passed on to consider cases in which absorption directly resulted from genital disease. Chronic streptococcal infection of the cervix might produce arthritis, fibrositis, myositis and similar generalized conditions which were in danger of being treated as primary enteritis unless a thorough vaginal examination was made. Genital infection was often associated with infection of the urine, the latter being a secondary result, and unless the genital canal was treated it was impossible permanently to purge the urine of organisms. Affections of the eye like choroiditis and iridocyclitis might even have a genital origin, and they instanced cases in which cure or arrest of the disease had followed treatment of the genital infection.

The paper was discussed by the PRESIDENT, Dr. RUSSELL ANDREWS, Dr. DICKSON, Sir G. BLACKER, Mr. ERNEST CLARKE, Dr. COLLINGWOOD, and Mr. LOCKHART MUMMERY.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

A meeting of the North of England Obstetrical and Gynæcological Society was held in Manchester on Friday, October 19th, 1923, the President, Professor BLAIR BELL, being in the chair.

Dr. J. H. WILLETT (Liverpool) showed a sarcoma of the uterus. The specimen was removed from a nulliparous woman, married six months, and was diagnosed as cystic adenoma of ovary with fibroid in uterus.

At operation, cyst tapped and blood-stained fluid evacuated. Only then did the origin of the tumour become apparent.

Specimen: Partly cystic, partly solid mass arising from fundus of slightly enlarged uterus, in which was a small fibroid nodule. Sections of both showed appearance of mixed-celled sarcoma.

Three months after operation patient looked well and had gained 17 lbs., although portions of capsule of growth had been left adherent to intestines.

The PRESIDENT recalled a similar case in his experience.

Dr. DONALD requested Dr. Willett to report on the case in twelve months' time, to inform the Society if the patient was without recurrence.

Dr. H. LEITH MURRAY (Liverpool) showed sections of a squamous-celled

carcinoma of the cervix from a nullipara aged 27 years. She had been married 2½ years. Bleeding and discharge for seven months, and loss of weight. The cervix was thickened and ulcerated, and the growth had invaded the broad ligaments and utero-sacral ligaments and was quite ineradicable.

The PRESIDENT recalled a similar case in his experience which had occurred in a woman who had had syphilis.

Dr. H. LEITH MURRAY (Liverpool) described a case of colloid carcinoma of the uterus in a 2-para, aged 28. She complained of pain in the bowels for six months. Previously menstruation 6/14, recently 4/28. No blood-stained discharge. No urinary trouble, and no loss of weight.

On examination there was a large mass in the abdomen extending nearly up to the umbilicus, and distending the anterior abdominal wall. Above this a movable mass, the size of a fist.

On vaginal examination the cervix was found so greatly enlarged as to fill the vagina up to the ostium vaginæ and prevent insertion of finger between it and vaginal walls. The cervix was ulcerated, was continuous with abdominal mass, and was absolutely fixed.

Sections of pieces of cervix showed typical colloid carcinoma with normal cervical glands scattered throughout, in some places greatly compressed.

Diagnosis was malignant ovaries with colloid cancer of the uterus, and secondary omental deposit. This was confirmed by laparotomy, and portion of omental growth was removed and showed on section the typical colloid appearance.

The patient died six weeks after operation. Origin of the colloid growth was obscure, owing to presence of normal cervical glands in all sections, and yet with so great an enlargement of the cervix.

Dr. J. E. GEMMELL (Liverpool) read notes of two cases of fibroid tumours associated with gestation.

Case 1. A 5-para with a fibroid, undergoing red degeneration, growing from the fundus uteri, which was detected in the early stage of pregnancy, gave rise to no symptoms or discomfort during gestation, and ended in a normal labour, and was of such a size that its weight was 4 lbs. 3 ozs. During the puerperium pain and pyrexia were marked; the accompanying toxæmia determining operative treatment by hysterectomy. Intermittent pains, commencing 24 hours before operation, had resulted in dilatation of cervix and expression of a large part of the growth filling the vagina. The tumour was a typical example of red degeneration, with necrosis.

Case 2. A 2-para, with a history of three months' amenorrhœa and recent slight, blood-stained discharge. There was a fibroid, the size of a tennis ball, posteriorly and filling the pouch of Douglas, with double ovarian cysts, and the whole of the pelvic organs matted in the pelvis and forming a fixed mass. Panhysterectomy was done. The cysts proved to be "cystadenoma."

Dr. DOUGAL (Manchester) read a short paper on the operative treatment of certain cases of incontinence of urine occurring in nulliparous women.

The degree of urinary control has been expressed by Taylor and Watt as :—

(1) Normal.

(2) Fair, which is normal except on special occasions, as, for example, distension of the bladder, temporary vesical irritability, or times of mental or physical fatigue.

(3) Poor; which allows the urine to escape on any special abdominal strain such as may be caused, for example, by coughing or active exercise, such patients being wet most of the time.

(4) Lost; when urine continually dribbles from the patient and very little is retained in the bladder.

Taking the "poor" and "lost" groups only the figures show that about 8 per cent. nulliparous women suffer from a disagreeable amount of urinary incontinence (Taylor and Watt). In this paper he dealt only with those cases of active incontinence of urine which are due to weakness of the sphincter vesicæ. He said that the sphincter apparatus of the bladder consisted of three parts:—

(1) *Intrinsic sphincter,* which is merely a specialized portion of the middle stratum of the bladder musculature. Its presence is even denied by some authorities.

(2) *Extrinsic or urethral sphincter,* composed of fibres of compressor urethræ, and forms a complete muscular ring round the upper part of the urethra. All authorities are agreed that this is the most important factor in sphincter apparatus.

(3) *The supporting fibromuscular tissues lying between base of bladder and the anterior vaginal wall.* It is made up of paravesical vascular sheaths and their connexions, and is strongly developed towards each side where it is closely related in front to the anterior layers of the levator ani, and behind to the parametric tissue.

He considered that the sphincters are the most important factors, and in support of this contention he cited the fact that incontinence of urine is not commonly met with in cases of prolapse, even when the anterior vaginal wall, and presumably the supporting structures of the bladder, are much weakened and displaced.

He described the more important operations for the cure of this condition illustrated by lantern slides.

The operation he performed in his successful cases was as follows: The perineum was first incised to allow of easier access to the parts. A triangular area of the anterior vaginal wall was then removed, exposing the urethra and bladder. A mushroom catheter was then passed into the bladder and, using this as a guide, two mattress sutures of catgut were inserted into the tissues on each side of the bladder neck (after Kelly). Deep sutures were then inserted through the paraurethral tissues to narrow the canal throughout its length, and the anterior colporrhaphy then completed in two layers. Finally the perineal incision was sutured.

Notes on two cases:—

Case 1. Miss D., aged 26 years. Menstrual history normal. A thin poorly nourished woman, very little energy, and very depressed and miserable. She has suffered from urinary incontinence practically since birth, being troubled through the day, but worse at night. She has tried all sorts of medical treatment. On examination the external genitals were normal and of virginal type. The vaginal orifice admitted one finger with difficulty, but the upper part of the anterior vaginal wall appeared somewhat lax, although there was no actual prolapse. The uterus was normal in size and acutely anteflexed.

After the operation, as above, she needed catheterization for a week. Her bed was wet once before discharge from hospital. She has been well

ever since then—2½ years ago—and is now a cheerful, healthy-looking, young woman.

Case 2. Miss T., aged 21 years. Menstrual history normal. Rather thin and miserable, and not very bright mentally. She was perfectly normal till an acute illness 10 years ago, but since then has been incontinent, chiefly at night, but also during the day. For the last six years has not had a holiday owing to bed-wetting.

On examination the external genitals were normal. The vaginal orifice was virginal, and again a considerable laxity of the upper part of the anterior vaginal wall was found. The uterus was normal in size and acutely anteflexed.

It is now six months since her operation and she has wet her bed twice since; but she has been away for a holiday, and is much better in every way.

The great majority of these cases of incontinence can be cured, or at any rate much relieved, by operative treatment. There is no doubt that many young single women are allowed to go on suffering from this distressing ailment because no obvious lesion can be made out, and the disability is attributed to neurosis. There is a neurotic element, no doubt, in some cases, but the real underlying cause will be found to be in a weakness of the sphincter mechanism, which can often be dealt with successfully by surgical methods.

In the discussion which followed, Dr. MILES PHILIPS said he thought that incontinence of urine was a common feature of partial vaginal prolapse in multiparæ.

The PRESIDENT expressed surprise at the high figure (8 per cent.) of incontinence in nulliparæ. He did not believe that incontinence was due to neurosis. There was not a single structure in the apparatus which could be said to constitute a true sphincter.

Dr. FOTHERGILL said he had done Pawlik's operation a few times with success. He questioned that incontinence of urine was common in cases of vaginal prolapse in multiparæ. He thought that the operative measures taken were a suggestive treatment.

Dr. LEITH MURRAY said that the fact that the incontinence was worse at night pointed to a neurotic rather than to the dislocation theory.

THE ROYAL ACADEMY OF MEDICINE IN IRELAND.

A Meeting of the Section of Obstetrics of the Royal Academy of Medicine in Ireland was held in the Royal College of Physicians on Friday, October 26th, the President, Dr. LOUIS L. CASSIDY, in the Chair.

Dr. LOUIS CASSIDY expressed his thanks to the Section for electing him as President and said that he hoped to carry on the high tradition of the Obstetrical Section. He then introduced Dr. ZWEIFEL of Munich, who read a paper on the treatment of

CANCER OF THE CERVIX UTERI BY DEEP X-RAY THERAPY.

Having described the apparatus he said that there were three different methods of treatment:—

(1) Primary radium, or X-rays, followed by operation.
(2) Operation, followed by radium or X-ray treatment.
(3) Treatment followed by either radium, X-rays, or both combined.

At 21 gynæcological clinics in Germany, in 15 operation is performed upon all operable cases, and in the other six every patient is treated by X-rays or radium.

He pointed out that in Bumm's Clinic in Berlin in a long series of cases the percentage of definite cures after operation had been doubled by post-operative X-ray treatment.

The unit skin dose of X-rays is that which after six to eight days produces a red discolouration of the skin, and after three to four weeks produces tanning. If this unit skin dose is represented by 100, then the cancer dose as determined by Seitz and Wintz is from 90 to 110. The depth of the cervix from the abdominal wall is from 7 to 10 cm., and experiment has shown that at this depth the effective dose is 20 per cent. of the surface dose, so that the rays have to be concentrated from six or seven fields in order to get the cancer dose at this depth. As it is not possible by this method to radiate the whole pelvic cavity effectively at one sitting, the tumour itself is radiated first, and after about six weeks' interval the parametria are treated. The duration of the exposure for each field is about half an hour. The after-treatment is of great importance, as cure depends upon the ability of the organs to react against the cancerous disease. The treatment is attended with considerable risk to both the operator and the patient and should be regarded as a major operation.

Of all patients treated for cancer by deep therapy about 20 per cent. can be cured, and of all operable cases about 50 per cent. can be cured for five years or longer. When cure is not obtained great relief from the symptom is often obtained.

Dr. Maurice Hayes said that deep X-ray therapy was not new. The only new thing was that with improvements in the apparatus they were now able to produce a more penetrating ray than formerly. They were now working with apparatus which could produce continuously a voltage of about two hundred thousand. Dr. Zweifel had sounded a note of warning, which he (Dr. Hayes) was delighted to hear. Deep X-ray therapy was a major operation, but the shock after the treatment depended more or less on the method in which the therapy was produced, and the shock was as great as that which followed hysterectomy. The dangers in the use of the apparatus, both to the patient and to the operator, were manifest, and were very serious. Dr. Zweifel had been moderate in his claims for the success of the treatment. His (Dr. Hayes) experience during the last few years (and he thought it was the experience of all doctors) was that the public had become panicy about cancer. Newer methods for the treatment of this disease had been unworthily written about in the Press, and therefore he felt that if in this country at any rate deep X-ray therapy was going to be allowed to develop, and to bear fruit, the claims for it must be moderate, and the treatment must be carried out with thoroughness and efficiency, and nothing should be claimed for it more than it was possible for it to achieve. There was at present a controversy on the Continent in reference to the technique of this treatment, and this controversy arose principally

over the question of stimulation. He personally had never been able to accept without reservations the view that the cancer cells were stimulated by the continuous application of X-rays. He thought if this was the case, that for years past they must have been doing nothing but spreading cancer by giving stimulating doses, and yet many cures had been got. When giving X-ray treatment they tried to get good results, but when the results were good they did not know why they were obtained, and he thought that as little was known about the mode of action of X-rays as was known twenty years ago. In cases of malignant disease which were operable, and in which there were no contra-indications to operation, he thought that the surgeon was the proper person to deal with the case, and not the radiologist, and further he was of opinion that there should be no competition between the two. In some cases operation and X-ray treatment were of great value, but that it was not right to exclude one to the advantage of the other. He had treated a few cases which had been deemed inoperable, and in which the prognosis had been almost hopeless, but which after X-ray treatment had recovered.

Dr. T. G. HARDMAN said that he would like to associate himself in thanking Dr. Zweifel for his most interesting and instructing communication, from which they had all learned a great deal. He agreed with Dr. Hayes that deep X-ray therapy was not new, although some people thought that it was different from what all radiologists had been doing for some years past. The trouble in the past had been that their apparatus had not been sufficient to produce the power of penetration which was necessary. He was of opinion that the two chief advances which had been made of late were the new apparatus, which had such high voltage, and the apparatus for measuring the doses, which was of great importance. He thought that they had to be guided to some extent by the experience which they gained by treating cases as time went on, and that treatment by deep X-ray therapy was a way in which deep blows could be delivered to cancer. It was stated that in some cases small doses had stimulated the growth of cancer, but yet he thought that the past experience of radiologists had not shown this. He personally had not had much experience in the treatment of cancer, and the cases he had treated had been mostly recurrent cancer in the breast, and the results obtained in these cases had been most encouraging. He felt that with the new and more scientific apparatus which was in use now, and especially with the use of the apparatus for measuring the dose, that they might hope for very good results from this treatment in the future.

Dr. PILGER (Erlangen) said that he thought X-rays could be considered as a medicament, and that there should be certain doses for the different parts of the body. This dosage had of late years been more accurately accomplished to determine than formerly, but there were still great difficulties to be overcome in connection with it, as they were really still in the dark on the subject, as all they knew was that a certain amount of X-rays would produce a certain amount of cure. Certain doses had been determined for certain parts of the body, but it had still to be determined which dose gives the best percentage of cures. The human body was a very complex construction, and therefore it was very difficult to be sure whether one was giving the right dose or not. In cases in which it were possible he thought an operation should be performed before treatment by X-rays was tried, unless a very extensive operation was necessary, the

result of which would be uncertain. In such cases, treatment by X-rays should be considered. It was not a question of competition between operative treatment and X-ray treatment but a question of doing which ever it was thought would be best for the patient.

Dr. W. C. STEVENSON said that he treated all his cases by radium, and it was a good many years since he had used X-rays, but whenever he brought a case before the Academy of Medicine, on radium, he always mentioned that the same results could be got by X-rays, as they were similar to the radium rays. In both there was the powerful therapeutic agent for the treatment of cells of any kind, pathological or otherwise. In radium, if one used a certain amount of filtration, and certain distance pieces, one got practically the same results as would be obtained by treatment by deep X-ray therapy. He knew of cases of tubercular disease of the peritoneum which were completely cured by radium. Some cases of malignant disease, in which the outlook was good, when treated by radium did not recover, and yet in others in which the outlook was not so good, recovery took place. In some cases X-ray treatment was only resorted to when every other method of treatment had failed : in such cases, of course, good results could not be expected. In X-ray treatment, as in all other treatment, the patient had the cure largely in his own hands, as all the treatment did really was to help the patient to cure himself.

Dr. C. M. O'BRIEN said that it was hard to determine the length of time which should elapse after a patient had had X-ray treatment before considering that they were really cured of malignant disease. He thought five years quite inadequate, and was of opinion that it should be at least seven years. He thought there should not be any question as to which was the better treatment, radium or X-rays, and was of opinion that a union of the two was the best and wisest method of treatment.

Dr. ZWEIFEL replied. Sir James Craig proposed a vote of thanks to Dr. Zweifel, which was seconded by Dr. T. G. Moorhead, and the meeting concluded.

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